

# **NOTICE TO CONTRACTORS AND SPECIAL PROVISIONS**

## **FOR CONSTRUCTION ADJACENT TO STATE HIGHWAY**

IN LOS ANGELES COUNTY  
AT VARIOUS LOCATIONS  
DISTRICT 7, ROUTES 1, 5, 91, 210, AND 605

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For use in Connection with Department of Transportation  
Standard Specifications **DATED JULY**, 1995, and Department  
of Transportation Standard Plans **DATED JULY**, 1997.

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**AS-BUILT 12/15/1999**

These As-Built Special Provisions have been prepared in Microsoft Word with the *Track Changes* mode to facilitate identification of As-Built information. Specifications which have been modified to reflect As-Built conditions are identified with a vertical bar in either the Right hand or Left hand margin. Contract specifications not incorporated during construction appear in Strikeout, while specifications adding during construction appear in Italics.

Please note that these Special Provisions only reflect the As-Built condition of the work performed, and should not necessarily be considered a replacement to the Contract Special Provisions. Although they may be suitable for future similar projects, it is ultimately the responsibility of the Design Engineer to prepare appropriate Special Provisions for each particular contract.

**AS-BUILT 12/15/1999**

**AS-BUILT SPECIFICATION REVISION SUMMARY**  
**DISTRICT 7 – PROCUREMENT**  
**CONTRACT NUMBER: 43A0002C**

**Work Package 1**

Sites: 1, Altadena Maintenance Station Bio-Strip/Inf. Trench; 2, Foothill Maintenance Station DII; 3, Las Flores Maintenance Station DII; 4, Rosemead Maintenance Station DII

CCO	Description	Affected Location	Needed Change to Specification	Affected Spec. Section No.
1	Light Standard Foundation	1	None	None
2	Infiltration Trench Re-design	1	None	None
3	Misc. Electrical	2	None	None
4	Misc. Electrical	3	None	None
5	Misc. Electrical	4	None	None
6	Equipment Pad Extensions	2,3,4	None	None
7	Additional Salt Grass Flats	1	None	None
8	Weir Plate and 2 inch Drain	1	None	None
9	Additional AC Removal & Repair	1	None	None
10	Concrete Storage Bins	1	None	None
11	Pre-purchased Items	1,2,3,4	None	None
Post Const	6 inch Spreader Drain	1	Added new specification	10-1.36
Post Const	Equipment Pad Relocation	3	Added new specification	10-1.35

**Work Package 2**

Sites: 1, SR-91/I-605 Bio-Strip/Bio-Swale; 2, SR-91/Cerritos MS Bio-Swale; 3, I-5/I-605 Bio-Swale; 4, I-605/Del Amo Bio-Swale

CCO	Description	Affected Location	Needed Change to Specification	Affected Spec. Section No.
1	Maintenance Pullout Cancellation	3	None	None
2	Top Soil (160 x d)	1	None	None
3	Access Gate	2	None	None
4	Fill Dissipator and Flow Spreader	1,2,3,4	Added new specification	8-4.02
5	Raise Flume Structure	4	None	None
6	Relocate Irrigation Facilities	4	None	None
7	Additional Salt Grass Flats	1,2,3,4	None	None
8	Bonds & Pre-purchased Items	1,2,3,4	None	None
9	Relocate Light Standard	1	None	None
10	Additional K-Rail Rental	1	None	None
11	Crash Cushion Array	1	None	None
Post Const	Misc. Modifications	1	None	None
Post Const	Grout Dissipator & Flow Spreader	1,2,3,4	Added new specification	10-1.34

**AS-BUILT 12/15/1999**

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## 5-1.05 PUBLIC SAFETY

The Contractor shall provide for the safety of traffic and the public in accordance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

The Contractor shall install temporary railing (Type K) between any lane carrying public traffic and any excavation, obstacle, or storage area when the following conditions exist:

- (1) Excavations.—Any excavation, the near edge of which is 3.6 m or less from the edge of the lane, except:
  - (a) Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
  - (b) Excavations less than 0.3-m deep.
  - (c) Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
  - (d) Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
  - (e) Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
  - (f) Excavations protected by existing barrier or railing.
- (2) Temporarily Unprotected Permanent Obstacles.—Whenever the work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or whenever the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
- (3) Storage Areas.—Whenever material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the specifications.

The approach end of temporary railing (Type K), installed in accordance with the requirements in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications shall be offset a minimum of 4.6 m from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than 0.3-m transversely to 3 m longitudinally with respect to the edge of the traffic lane. If the 4.6-m minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)" of the Standard Specifications, except temporary railing (Type K) fabricated prior to January 1, 1993, with one longitudinal No. 15 reinforcing steel bar near the top in lieu of the 2 longitudinal No. 15 reinforcing steel bars near the top, as shown on the plans, may be used.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" elsewhere in these special provisions.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas the Contractor shall close the adjacent traffic lane unless otherwise provided in the specifications:

Approach speed of public traffic (Posted Limit) (Kilometers Per Hour)	Work Areas
Over 72 (45 Miles Per Hour)	Within 1.8 m of a traffic lane but not on a traffic lane
56 to 72 (35 to 45 Miles Per Hour)	Within 0.9-m of a traffic lane but not on a traffic lane

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of traffic lane, the line of cones or delineators shall be considered to be the edge of traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 3 m without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the requirements in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

#### **5-1.06 AREAS FOR CONTRACTOR'S USE**

Attention is directed to the requirements specified in Section 7-1.19, "Rights in Land and Improvements," of the Standard Specifications and these special provisions.

The highway right of way shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

There are no State-owned parcels adjacent to the right of way for the exclusive use of the Contractor within the contract limits. The Contractor shall secure, at the Contractor's own expense, any area required for plant sites, storage of equipment or materials, or for other purposes.

No area is available within the contract limits for the exclusive use of the Contractor. However, temporary storage of equipment and materials on State property may be arranged with the Engineer, subject to the prior demands of State maintenance forces and to all other contract requirements. Use of the Contractor's work areas and other State-owned property shall be at the Contractor's own risk, and the State shall not be held liable for any damage to or loss of materials or equipment located within such areas.

### **5-1.07 SOUND CONTROL REQUIREMENTS**

Sound control shall conform to the provisions in Section 7-1.01I, "Sound Control Requirements," of the Standard Specifications and these special provisions.

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 7:00 a.m., shall not exceed 86 dbA at a distance of 15 m. This requirement in no way relieves the Contractor from responsibility for complying with local ordinances regulating noise level.

The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.



### 8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the inch-pound (imperial) system which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following requirements:

Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.

Before other non-metric materials and products will be considered for use the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish all information necessary as required to the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision shall be final.

When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, the list of sources of material as specified in Section 6-1.01, "Source of Supply and Quality of Materials," of the Standard Specification shall include a list of substitutions to be made and contract items involved. In addition, for any change in design or details the Contractor shall submit plans and working drawings in accordance with Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

Attention is directed to "Reinforcement" in these special provisions for allowable substitutions of imperial reinforcing bars for metric reinforcing bars.

The following substitutions of materials and products will be allowed:

SUBSTITUTION TABLE FOR SIZES OF HIGH STRENGTH STEEL FASTENERS  
ASTM Designation: A 325M

METRIC SIZE SHOWN ON THE PLANS mm x thread pitch	IMPERIAL SIZE TO BE SUBSTITUTED inch
M16 x 2	5/8
M20 x 2.5	3/4
M22 x 2.5	7/8
M24 x 3	1
M27 x 3	1-1/8
M30 x 3.5	1-1/4
M36 x 4	1-1/2

SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT, ASTM Designation: A 82

METRIC SIZE SHOWN ON THE PLANS mm <sup>2</sup>	US CUSTOMARY UNITS SIZE TO BE SUBSTITUTED inch <sup>2</sup> x 100
MW9	W1.4
MW10	W1.6
MW13	W2.0
MW15	W2.3
MW19	W2.9
MW20	W3.1
MW22	W3.5
MW25	W3.9, except W3.5 in piles only
MW26	W4.0
MW30	W4.7
MW32	W5.0
MW35	W5.4
MW40	W6.2
MW45	W6.5
MW50	W7.8
MW55	W8.5, except W8.0 in piles only
MW60	W9.3
MW70	W10.9, except W11.0 in piles only
MW80	W12.4
MW90	W14.0
MW100	W15.5

The sizes in the following tables of materials and products are exact conversions of metric sizes of materials and products and are listed as acceptable equivalents:

CONVERSION TABLE FOR SIZES OF:

- (1) STEEL FASTENERS FOR GENERAL APPLICATIONS, ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55, and  
(2) HIGH STRENGTH STEEL FASTENERS, ASTM Designation: A 325 or A 449

METRIC SIZE SHOWN ON THE PLANS mm	EQUIVALENT IMPERIAL SIZE inch
6, or 6.35	1/4
8 or 7.94	5/16
10, or 9.52	3/8
11, or 11.11	7/16
13 or 12.70	1/2
14, or 14.29	9/16
16, or 15.88	5/8
19, or 19.05	3/4
22, or 22.22	7/8
24, 25, or 25.40	1
29, or 28.58	1-1/8
32, or 31.75	1-1/4
35, or 34.93	1-3/8
38 or 38.10	1-1/2
44, or 44.45	1-3/4
51, or 50.80	2
57, or 57.15	2-1/4
64, or 63.50	2-1/2
70 or 69.85	2-3/4
76, or 76.20	3
83, or 82.55	3-1/4
89 or 88.90	3-1/2
95, or 95.25	3-3/4
102, or 101.60	4

CONVERSION TABLE FOR NOMINAL THICKNESS OF SHEET METAL

UNCOATED HOT AND COLD ROLLED SHEETS		HOT-DIPPED ZINC COATED SHEETS (GALVANIZED)	
METRIC THICKNESS SHOWN ON THE PLANS	EQUIVALENT US STANDARD GAGE	METRIC THICKNESS SHOWN ON THE PLANS	EQUIVALENT GALVANIZED SHEET GAGE
Mm	inch	mm	inch
7.94	0.3125	4.270	0.1681
6.07	0.2391	3.891	0.1532
5.69	0.2242	3.510	0.1382
5.31	0.2092	3.132	0.1233
4.94	0.1943	2.753	0.1084
4.55	0.1793	2.372	0.0934
4.18	0.1644	1.994	0.0785
3.80	0.1495	1.803	0.0710
3.42	0.1345	1.613	0.0635
3.04	0.1196	1.461	0.0575
2.66	0.1046	1.311	0.0516
2.28	0.0897	1.158	0.0456
1.90	0.0747	1.006 or 1.016	0.0396
1.71	0.0673	0.930	0.0366
1.52	0.0598	0.853	0.0336
1.37	0.0538	0.777	0.0306
1.21	0.0478	0.701	0.0276
1.06	0.0418	0.627	0.0247
0.91	0.0359	0.551	0.0217
0.84	0.0329	0.513	0.0202
0.76	0.0299	0.475	0.0187
0.68	0.0269		
0.61	0.0239		
0.53	0.0209		
0.45	0.0179		
0.42	0.0164		
0.38	0.0149		

CONVERSION TABLE FOR WIRE

METRIC THICKNESS SHOWN ON THE PLANS mm	EQUIVALENT USA STEEL WIRE THICKNESS inch	GAGE NO.
6.20	0.244	3
5.72	0.225	4
5.26	0.207	5
4.88	0.192	6
4.50	0.177	7
4.11	0.162	8
3.76	0.148	9
3.43	0.135	10
3.05	0.120	11
2.69	0.106	12
2.34	0.092	13
2.03	0.080	14
1.83	0.072	15
1.57	0.062	16
1.37	0.054	17
1.22	0.048	18
1.04	0.041	19
0.89	0.035	20

CONVERSION TABLE FOR PIPE PILES

METRIC SIZE SHOWN ON THE PLANS mm x mm	EQUIVALENT IMPERIAL SIZE inch x inch
PP 360 x 4.55	NPS 14 x 0.179
PP 360 x 6.35	NPS 14 x 0.250
PP 360 x 9.53	NPS 14 x 0.375
PP 360 x 11.12	NPS 14 x 0.438
PP 406 x 12.70 and * PP 460 x 12.70	NPS 16 x 0.500

\* Applies only to Standard Plan B2-11, Alternative "W" Steel  
Pipe - Pile Details.

CONVERSION TABLE FOR STRUCTURAL TIMBER AND LUMBER

METRIC MINIMUM DRESSED DRY, SHOWN ON THE PLANS Mm x mm	METRIC MINIMUM DRESSED GREEN, SHOWN ON THE PLANS mm x mm	EQUIVALENT NOMINAL US SIZE inch x inch
19x89	20x90	1x4
38x89	40x90	2x4
64x89	65x90	3x4
89x89	90x90	4x4
140x140	143x143	6x6
140x184	143x190	6x8
184x184	190x190	8x8
235x235	241x241	10x10
286x286	292x292	12x12

CONVERSION TABLE FOR NAILS AND SPIKES

METRIC COMMON NAIL, SHOWN ON THE PLANS  Length, mm Diameter, mm	METRIC BOX NAIL, SHOWN ON THE PLANS  Length, mm Diameter, mm	METRIC SPIKE, SHOWN ON THE PLANS Length, mm Diameter, mm	EQUIVALENT IMPERIAL SIZE  Penny-weight
50.80 2.87	50.80 2.51	————	6d
63.50 3.33	63.50 2.87	————	8d
76.20 3.76	76.20 3.25	76.20 4.88	10d
82.55 3.76	82.55 3.25	82.55 4.88	12d
88.90 4.11	88.90 3.43	88.90 5.26	16d
101.60 4.88	101.60 3.76	101.60 5.72	20d
114.30 5.26	114.30 3.76	114.30 6.20	30d
127.00 5.72	127.00 4.11	127.00 6.68	40d
————	————	139.70 7.19	50d
————	————	152.40 7.19	60d

## **8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS**

The Department maintains a trade name list of approved prequalified and tested signing and delineation materials and products. Approval of prequalified and tested products and materials shall not preclude the Engineer from sampling and testing of the signing and delineation materials or products at any time.

None of the listed signing and delineation materials and products shall be used in the work unless material or product is listed on the Department's List of Approved Traffic Products. A Certificate of Compliance shall be furnished as specified in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for signing and delineation materials and products. The certificate shall also certify that the signing and delineation material or product conforms to the prequalified testing and approval of the Department of Transportation, Division of Traffic Operations and was manufactured in accordance with the approved quality control program.

Materials and products will be considered for addition to the approved prequalified and tested list if the manufacturer of the material or product submits to the Division of Traffic Operations a sample of the material or product. The sample shall be sufficient to permit performance of required tests. Approval of materials or products will be dependent upon a determination as to compliance with the specifications and test the Department may elect to perform.

The following is a listing of approved prequalified and tested signing and delineation materials and products:

### **Pavement Markers, Permanent Type**

#### **REFLECTIVE**

1. Adelite (4"x4")
2. Apex, Model 921 (4"x4")
3. Pavement Markers, Inc., "Hye-Lite" (4"x4")
4. Ray-O-Lite, Models SS, RS and AA (4"x4")
5. Ray-O-Lite, Model 2002 (2.4"x4.7")
6. Stimsonite, Model 88 (4" x4")

#### **REFLECTIVE WITH ABRASION RESISTANT SURFACE**

1. Ray-O-Lite "AA" ARS (4"x4")(Not for use in recessed applications)
2. Ray-O-Lite Model 2002 ARS (2.2"x4.7")
3. Stimsonite, Model 911 (4"x4")(Not for use in recessed applications)
4. Stimsonite, Model 944 SB (2"x4")
5. Stimsonite, Model 948 (2.3"x4.7")
6. Stimsonite, Model 953 (2.75"x4.5")(Not for use in recessed applications)

#### **NON-REFLECTIVE FOR USE WITH EPOXY OR BITUMEN ADHESIVE**

1. Apex Universal (Ceramic)
2. Highway Ceramics, Inc. (Ceramic)
3. Zumar, TM40W/Y (Polyester)

## NON-REFLECTIVE FOR USE WITH BITUMEN ADHESIVE ONLY

1. Apex Universal, Model 929 (ABS)
2. Elgin Molded Plastics, "Empco-Lite" Model 900 (ABS)
3. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
4. Interstate Sales, "Diamond Back" (ABS)
5. Loomis Plastics, D-Dot (ABS)
6. Pavement Markers, Inc., (Marker Supply) - Models A1107 and AY1108 (ABS)
7. Road Creations, Model RCB4NR (Acrylic)

### **Pavement Markers, Temporary Type**

#### TEMPORARY MARKERS FOR LONG TERM DAY/NIGHT USE (6 months or less)

1. Apex Universal, Model 924 (4"x4")
2. Davidson Plastics, Model 3.0
3. Elgin Molded Plastics, "Empco-Lite" Model 901 (4" Round)
4. Highway Technologies, Megalites (4"x4")
5. Road Creations, Model R41C (4"x4")
6. Vega Molded Products "Temporary Road Marker" (3"x4")

#### TEMPORARY MARKERS FOR SHORT TERM DAY/NIGHT USE (14 days or less)

1. Apex Universal, Model 932
2. Davidson Plastics, Models TOM (Standard) with Reflexite PC-1000, or (WZ) with Reflexite AC-1000 Sheeting
3. Hi-Way Safety, Inc., Model 1280/1281 with Reflexite PC-1000

#### TEMPORARY MARKERS FOR SHORT TERM DAY/NIGHT USE (14 days or less at seal coat locations)

1. Apex Universal, Model 932
2. Davidson Plastics, Models TRPM (Standard) with Reflexite PC-1000, or (WZ) with Reflexite AC-1000 Sheeting
3. Davidson Plastics, Models "HH" (High Heat) TRPM (Standard) with Reflexite PC-1000, or (WZ) with Reflexite AC-1000 Sheeting
4. Hi-Way Safety, Inc., Model 1280/1281 with Reflexite PC-1000

### **Striping and Pavement Marking Materials**

#### PERMANENT TRAFFIC STRIPING AND PAVEMENT MARKING TAPE (For use on high and low volume roadways)

1. Advanced Traffic Marking, Series 300 and 400
2. Brite-Line, Series 1000
3. Swarco Industries, "Director 35" (For transverse application only)
4. Swarco Industries, "Director 60"
5. 3M, "Stamark" Series 380, A420, A440 and 5730
6. 3M, "Stamark" Series N420 and N440 (For transverse application only)



**PERMANENT TRAFFIC STRIPING AND PAVEMENT MARKING TAPE (For use on low volume roadways only)**

1. 3M, "Stamark" Series A320 Bisymetric

**TEMPORARY REMOVABLE STRIPING AND PAVEMENT MARKING TAPE**

1. Advanced Traffic Marking, ATM Series 200
2. Brite-Line, Series 100
3. P.B. Laminations, Aztec, Grade 102
4. Swarco Industries, "Director-2"
5. 3M, "Stamark" Brand, Detour Grade, Series 5710 and A620

**PREFORMED THERMOPLASTIC**

1. Flint Trading, "Premark" and "Permark 20/20 Flex"
2. Pavemark, "Hotape"

**REMOVABLE TRAFFIC PAINT**

1. Belpro, Series 250/252 and No. 93 Remover

**Class 1 Delineators**

**ONE-PIECE DRIVEABLE FLEXIBLE TYPE, 1700 mm (66")**

1. Carsonite, Curve-Flex CFRM-400
2. Carsonite, Roadmarker CRM-375
3. Davidson Plastics, "Flexi-Guide Models 400 and 566"
4. GreenLine Model HWDI-66
5. GreenLine Model CGDI-66
6. J. Miller Industries, Model JMI-375 with soil anchor)

**SPECIAL USE FLEXIBLE TYPE, 1200 mm (48")**

1. Carsonite, "Survivor" with 18" U-Channel anchor
2. FlexStake, H-D
3. GreenLine HWD with 18" soil anchor
4. GreenLine CGD with 18" soil anchor
5. Safe-Hit with 8" pavement anchor (SH248-GP1)
6. Safe-Hit with 15" soil anchor (SH248-GP2)
7. Safe-Hit with 18" soil anchor (SH248-GP3)

**SURFACE MOUNT FLEXIBLE TYPE, 1200 mm (48")**

1. Bent Manufacturing Co., "Masterflex" Model MF-180EX-48"
2. Carsonite, "Super Duck II"
3. FlexStake, Surface Mount H-D

## **Channelizers**

### **SURFACE MOUNT TYPE, 900 mm (36")**

1. Bent Manufacturing Co., "Masterflex" Models MF-360-36 (Round) and MF-180-36" (Flat)
2. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
3. Carsonite, Super Duck II Model SDCF203601MB "The Channelizer"
4. Davidson Plastics, Flex-Guide FG300
5. FlexStake, Surface Mount H-D
6. GreenLine, Model SMD-36
7. Repo, Models 300 and 400
8. Safe-Hit, Guide Post, Model SH236SMA, with glue down base
9. The Line Connection, "Dura-Post" Model DP36-3 (Permanent)
10. The Line Connection, "Dura-Post" Model DP36-3C (Temporary)

### **Type K Object Markers, 450 mm (18")**

1. Carsonite, Model SMD-615
2. Repo, Models 300 and 400
3. Safe-Hit, Model SH718SMA
4. The Line Connection, Model DP21-4K (Vertical configuration only)

### **Type K-4 Object Markers, 450-600 mm (18-24")**(previously listed as "Q")

1. Carsonite, Super Duck II
2. Repo, Models 300 and 400
3. Safe-Hit, Models SH824SMA--WA and SH824GP3--WA
4. The Line Connection, Model "DP21-4Q"

## **Concrete Barrier Markers** (For use to the left of traffic)

### **IMPACTABLE TYPE**

1. Astro Optics "FB"
2. Davidson Plastics, Model PCBM-12
3. Duraflex Corp., "Flexx 2020" and "Electriflexx"

### **NON-IMPACTABLE TYPE**

1. Astro-Optics, JD Series
2. Stimsonite, Model 967 (with 3 1/4" Acrylic cube corner reflector)
3. Stimsonite, Model 967LS (with Stimsonite Sheeting)
4. Vega Molded Products, Models GBM and JD

## **Thrie Beam Barrier Markers** (For use to the left of traffic)

1. Duraflex Corp., "Railrider"
2. Davidson Plastics, "Mini" (3"x10")

**Concrete Barrier Delineators, 400 mm (16")** (For use to the right of traffic. When mounted on top of barrier, places top of reflective element at 48" [1200 mm])

1. Davidson Plastics, Model PCBM T-16
2. Safe-Hit, Model SH216RBM

**Sound Wall Delineator** (On vertical surface, places top of reflective element at 48" [1200 mm])

1. Davidson Plastics, PCBM S-36

**Guard Railing Delineator, 685 mm (27") Wood Post Type** (For use to the right or left of traffic. Places reflective element at 48" [1200 mm].)

1. Carsonite, Model 427
2. Davidson Plastics FG 427 and FG-527
3. GreenLine GRD 27-inch
4. Safe-Hit, Model SH227GRD

**Guard Railing Delineator, 685 mm (27") Steel Post Type** (For use to the right or left of traffic. Places reflective element at 48" [1200 mm].)

1. Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

### **Reflective Sheeting**

#### **CHANNELIZERS, BARRIER MARKERS AND DELINEATORS**

1. 3M, High Intensity (Long Term)
2. Reflexite, PC-1000, Metalized Polycarbonate (Long Term)
3. Reflexite, AC-1000, Acrylic (Long Term)
4. Reflexite, AP-1000, Metalized Polyester (Short Term)
5. Reflexite, AR-1000, Abrasion Resistant Coating) (Short Term)
6. Stimsonite, Series 4500 (For rigid substrate devices only)

#### **TRAFFIC CONES, 330 mm (13") Sleeves**

1. Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

#### **TRAFFIC CONES, 100 and 150 mm (4" and 6") Sleeves**

1. 3M Series 3840
2. Reflexite Vinyl or "TR" (Semi-transparent)

#### **BARRELS AND DRUMS**

1. Reflexite, "Super High Intensity"
2. 3M Series 3810

#### **BARRICADES, Type I, Engineer Grade**

1. American Decal, Adcolite
2. Avery Dennison, 1500/1600
3. 3M, Scotchlite, Series CW

SIGNS (Sheeting Types conforming to the requirements of ASTM Designation: D 4956-93B)

1. Type II, Super Engineer Grade (State-Furnished Signs Only)

- A. Avery Dennison, "Fasign" 2500 Series
- B. Kiwalite, Type II
- C. Nikkalite 1800 Series

2. Type III, High Performance

- A. 3M, High Intensity, Series 3780

3. Type IV, High Performance

- A. Stimsonite, Series 4200

4. Type VI, Roll-Up Signs

- A. Reflexite, Vinyl

#### **Sign Substrate for Construction Area Signs**

1. Aluminum
2. Fiberglass Reinforced Plastic (FRP)
3. Sequentia, "Polyplate"
4. Fiber-Brite

### **8-1.03 STATE-FURNISHED MATERIALS**

Attention is directed to Section 6-1.02, "State-Furnished Materials," of the Standard Specifications and these special provisions.

The following materials will be furnished to the Contractor:

- Highway route shields for construction project funding signs.
- [Distichlis Spicata \(Salt Grass\) flats for Biofilters](#)

### **8-1.04 SLAG AGGREGATE**

Aggregate produced from slag resulting from any steel-making process or from air-cooled iron blast furnace slag shall not be used on this project.

### 8-1.05 ENGINEERING FABRICS

Engineering fabrics shall conform to the requirements in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

Nonwoven and woven rock slope protection fabric shall conform to the following additional requirement:

Specification	ASTM Designation	Requirement
Permittivity, 1/second, Minimum	D 4491	0.5

### 8-2.01 PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

Wherever the word "cement" is used in the Standard Specifications or the special provisions, and its use conforms to one of the following criteria, it shall be understood to mean "cementitious material":

- A. When the cement content of portland cement concrete is specified and Section 90, "Portland Cement Concrete," of the Standard Specifications is referenced.
- B. When the kilograms of cement per cubic meter for portland cement concrete is specified and Section 90, "Portland Cement Concrete," of the Standard Specifications is referenced.

The above criteria shall not apply when the use of mineral admixture is not allowed. Section 90-1.01, "Description," of the Standard Specifications is amended to read:

**90-1.01 Description.**—Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.

Unless otherwise specified, cementitious material to be used in portland cement concrete shall conform to the requirements for cement and mineral admixtures in Section 90-2, "Materials" and shall be either: 1) "Type IP (MS) Modified" cement; or 2) a combination of "Type II Modified" portland cement and mineral admixture.

Unless otherwise specified for pre-cast, steam cured, or other high early strength concrete, mineral admixture will not be required if it has been determined by the Transportation Laboratory and documented in writing by the Engineer that the aggregate is from a source that is not alkali silica reactive.

Concrete for each portion of the work shall comply with the requirements for the Class, cementitious material content in kilograms per cubic meter, 28-day compressive strength, minor concrete, or commercial quality concrete, as shown on the plans or specified in these specifications or the special provisions.

Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter.

Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter.  
Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter.  
Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter.

Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter unless otherwise specified in these specifications or the special provisions.

Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic meter of concrete in structures or portions of structures shall conform to the following:

Use	Cementitious Material Content (kg/m <sup>3</sup> )
Concrete which is designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min., 475 max.
Roof sections of exposed top box culverts	400 min., 475 max.
Other portions of structures	350 min., 475 max.
Concrete not designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min.
Roof sections of exposed top box culverts	400 min.
Pre-stressed members	400 min.
Seal courses	400 min.
Other portions of structures	350 min.

Whenever the 28-day compressive strength shown on the plans is 25 MPa or greater, the concrete shall be considered to be designated by compressive strength. If the plans show a 28-day compressive strength which is 31 MPa or greater, an additional 7 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans which are less than 25 MPa, are shown for design information only and are not to be considered a requirement for acceptance of the concrete.

Concrete designated by compressive strength shall be proportioned such that the concrete will conform to the strength shown on the plans or specified in the special provisions.

The Contractor shall determine the mix proportions for all concrete except pavement concrete. The Engineer will determine the mix proportions for pavement concrete.

Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.

Compliance with cementitious material content requirements will be verified in accordance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.

If any concrete used in the work has a cementitious material content, consisting of cement, mineral admixture, or cement plus mineral admixture, which is less than the minimum required for the work, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to

the State \$0.55 for each kilogram of cement, mineral admixture, or cement plus mineral admixture which is less than the minimum required for the work. The Department may deduct the amount from any monies due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions for cementitious material content will be made based on the results of California Test 518.

The requirements of the preceding paragraph shall not apply to minor concrete nor commercial quality concrete.

All concrete for which the mix proportions are determined either by the Contractor or the Engineer shall conform to the requirements of this Section 90.

The first paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is amended to read:

**90-2.01 Portland Cement.**—Unless otherwise specified, portland cement shall be either "Type IP (MS) Modified" cement or "Type II Modified" portland cement.

"Type IP (MS) Modified" cement shall conform to the specifications for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate mixture of Type II cement and not more than 25 percent of a mineral admixture. The type and minimum amount of mineral admixture used in the manufacture of "Type IP (MS) Modified" cement shall be in accordance with the provisions of Section 90-4.08, "Required Use of Mineral Admixtures."

"Type II Modified" portland cement shall conform to the specifications for Type II portland cement in ASTM Designation: C 150.

In addition, "Type IP (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:

- A. The cement shall not contain more than 0.60 percent by mass of alkalis, calculated as the percentage of  $\text{Na}_2\text{O}$  plus 0.658 times the percentage of  $\text{K}_2\text{O}$ , when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in accordance with the requirements of ASTM Designation: C 114.
- B. The autoclave expansion shall not exceed 0.50 percent.
- C. Mortar, containing the cement to be used and Ottawa sand, when tested in accordance with California Test 527, shall not expand in water more than 0.010 percent and shall not contract in air more than 0.048 percent except that when cement is to be used for pre-cast pre-stressed concrete piling, pre-cast pre-stressed concrete members or steam cured concrete products, the mortar shall not contract in air more than 0.053 percent.

The second paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is amended to read:

Type III and Type V portland cements shall conform to the specifications in ASTM Designation: C 150, and the modifications listed above for Type II Modified portland cement, except that when tested in accordance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.

The third paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is deleted.

The twelfth paragraph in Section 90-2.02, "Aggregates," of the Standard Specifications is deleted.

The first paragraph in Section 90-2.03, "Water," of the Standard Specifications is amended to read:

**90-2.03 Water.**—In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>. In pre-stressed concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 650 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>. In no case shall the water contain an amount of impurities that will cause either: 1) a change in the setting time of cement of more than 25 percent when tested in accordance with ASTM Designation: C 191 or ASTM Designation: C 266; or 2) a reduction in the compressive strength of mortar at 14 days of more than 5 percent, when tested in accordance with ASTM Designation: C 109, when compared to the results obtained with distilled water or deionized water, tested in accordance with ASTM Designation: C 109.

The following section is added to Section 90-2, "Materials," of the Standard Specifications:

**90-2.04 Admixture Materials.**—Admixture materials shall conform to the requirements of the ASTM Designations shown below:

Chemical Admixtures—ASTM Designation: C 494.

Air-entraining Admixtures—ASTM Designation: C 260.

Calcium Chloride—ASTM Designation: D 98.

Mineral Admixtures—Coal fly ash, raw or calcined natural pozzolan as specified in ASTM Designation: C 618, except that the loss on ignition shall not exceed 4 percent, or, silica fume as specified in ASTM Designation: C 1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

Mineral admixtures shall be used in accordance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

Section 90-4.02, "Materials," of the Standard Specifications is amended to read:

**90-4.02 Materials.**—Admixture materials shall be as specified in Section 90-2.04, "Admixture Materials."

Section 90-4.05, "Optional Use of Chemical Admixtures," of the Standard Specifications is amended to read:

**90-4.05 Optional Use of Chemical Admixtures.**—The Contractor will be permitted to use Type A or F, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM Designation: C 494 to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:

When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent



by mass except that the resultant cementitious material content shall be not less than 300 kilograms per cubic meter.

When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.

Section 90-4.07, "Optional Use of Air-entraining Admixtures," of the Standard Specifications is amended to read:

**90-4.07 Optional Use of Air-entraining Admixtures.**—When air-entrainment has not been specified or ordered by the Engineer, the Contractor will be permitted to use an air-entraining admixture to facilitate the use of any construction procedure or equipment provided that the average air content, as determined by California Test 504, of 3 successive tests does not exceed 4 percent and no single test value exceeds 5.5 percent. If the Contractor elects to use an air-entraining admixture in concrete for pavement, the Contractor shall so indicate at the time the Contractor designates the source of aggregate as provided in Section 40-1.015, "Cement Content."

Section 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications is amended to read:

**90-4.08 Required Use of Mineral Admixtures.**—Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material for use in portland cement concrete.

The calcium oxide content of mineral admixtures shall not exceed 10 percent and the alkali content as Na<sub>2</sub>O shall not exceed 4 percent as determined by California Test 404.

The amounts of cement and mineral admixture used in cementitious material for portland cement concrete shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:

The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.

The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:

- A. When the calcium oxide content of a mineral admixture, measured in conformance with the requirements of ASTM Designation: C 618 and Section 90-2.04, "Admixture Materials," is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
- B. When the calcium oxide content of a mineral admixture, measured in conformance with the requirements of ASTM Designation: C 618 and Section 90-2.04, "Admixture Materials," is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix.

- C. When a mineral admixture is used, which conforms to the requirements for silica fume in Section 90-2.04, "Admixture Materials," is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix.

If more than the required amount of cementitious material is used, the additional cementitious material in the mix may be either cement, mineral admixture or a combination of both; however, the maximum amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

Section 90-4.09, "Optional Use of Mineral Admixture," of the Standard Specifications is deleted.

Section 90-4.11, "Storage, Proportioning, and Dispensing of Mineral Admixtures," of the Standard Specifications is amended to read:

**90-4.11 Storage, Proportioning, and Dispensing of Mineral Admixtures.**—Mineral admixtures shall be protected from exposure to moisture until used. Sacked material shall be piled to permit access for tally, inspection and identification for each shipment.

Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures in order to prevent any but the specified mineral admixtures from entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.

Mineral admixtures shall be incorporated into concrete using equipment conforming to the requirements for cement weigh hoppers, and charging and discharging mechanisms in ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section 90-4.11.

When interlocks are required for cement and mineral admixture charging mechanisms by Section 90-5.03A, "Proportioning for Pavement," and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.

Section 90-5.02, "Proportioning Devices," of the Standard Specifications is amended to read:

**90-5.02 Proportioning Devices.**—All weighing, measuring or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, any automatic weighing systems used shall comply with the requirements for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." These automatic devices shall be automatic to the extent that the only

manual operation required for proportioning the aggregates, cement, and mineral admixture for one batch of concrete is a single operation of a switch or starter.

Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to insure their accuracy.

Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the mass of each batch of material shall not vary from the mass designated by the Engineer by more than the tolerances specified herein.

Equipment for cumulative weighing of aggregate shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be  $\pm 0.5$  percent of the individual batch mass designated for each size of aggregate. Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch mass of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately shall have a zero tolerance of  $\pm 0.5$  percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of  $\pm 0.5$  percent of its designated mass or volume.

The mass indicated for any batch of material shall not vary from the pre-selected scale setting by more than the following:

- A. Aggregate weighed cumulatively shall be within 1.0 percent of the designated total batch mass of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch masses.
- B. Cement shall be within 1.0 percent of its designated batch mass. When weighed individually, mineral admixture shall be within 1.0 percent of its designated batch mass. When mineral admixture and cement are permitted to be weighed cumulatively, cement shall be weighed first to within 1.0 percent of its designated batch mass, and the total for cement and mineral admixture shall be within 1.0 percent of the sum of their designated batch masses.
- C. Water shall be within 1.5 percent of its designated mass or volume.

Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a mass not exceeding the maximum permissible mass variation above, except that no scale shall be required having a capacity of less than 500 kg, with 0.5 kg graduations.

Section 90-5.03, "Proportioning," of the Standard Specifications is amended to read:

**90-5.03 Proportioning.**—Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture and water as provided in these specifications. Aggregates shall be proportioned by mass.

At the time of batching, all aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture

content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.

Bulk "Type IP (MS) Modified" cement, that conforms to the requirements in Section 90-2.01, "Portland Cement," shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge. Except as otherwise noted below, the cement hoppers may be attached to a separate scale for individual weighing. If the cement is weighed cumulatively, the cement shall be weighed before the other ingredients.

Bulk cement to be blended with mineral admixture for use in portland cement concrete for pavement and structures shall be proportioned by one of the following methods:

1. Bulk cement and mineral admixture shall be weighed in individual weigh-hoppers and shall be kept separate from each other and from the aggregates until the ingredients are released for discharge into the mixer. The weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and a weight indicator to constitute an individual and independent material weighing device. The aggregate, the cement, and the mineral admixture shall be discharged into the mixer simultaneously.
2. Bulk cement and mineral admixture may be weighed in the same weigh hopper if the mix uniformity conforms to the requirements of Annex "A1, Concrete Uniformity Requirements," of ASTM Designation: C 94 as tested by the Contractor. The capability of the mixing methods and devices shall be established before starting production of portland cement concrete for contract work. Mix uniformity sampling and testing shall be done in the presence of the Engineer. The Engineer shall approve the mixing methods and devices as a supplement to California Test 109. The time between tests for mix uniformity testing shall be the same as that required by California Test 109 for portland cement concrete batch plant scale calibration.

The scale and weigh hopper for bulk weighing cement, mineral admixture, and cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.

When the source of any aggregate is changed for concrete structures, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using such aggregates. When the source of any aggregate is changed for other concrete, the Engineer shall be allowed sufficient time to adjust the mix and such aggregates shall not be used until necessary adjustments are made.

For all batches with a volume of one cubic meter or more, the batching equipment shall conform to one of the following combinations:

- A. Separate boxes and separate scale and indicator for weighing each size of aggregate.
- B. Single box and scale indicator for all aggregates.

C. Single box or separate boxes and automatic weighing mechanism for all aggregates.

In order to check the accuracy of batch masses, the gross mass and tare mass of batch trucks, truck mixers, truck agitators, and non-agitating hauling equipment shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

Section 90-5.03A, "Proportioning for Pavement," of the Standard Specifications is amended to read:

**90-5.03A Proportioning for Pavement.**—Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to the requirements specified in this Section 90-5.03A.

The Contractor shall install and maintain in operating condition an electrically actuated moisture meter that will indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched within a sensitivity of 0.5 percent by mass of the fine aggregate.

The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses which are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.

When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.

Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.

When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.

The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

The third paragraph in Section 90-6.01, "General," of the Standard Specifications is amended to read:

All concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.

The third and fourth paragraphs in Section 90-6.02, "Machine Mixing," of the Standard Specifications are amended to read:

The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one-fourth of the specified mixing time.

Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, or in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions which reduce or vary the required quantity of cementitious material in the concrete mixture.

The sixth paragraph in Section 90-6.02, "Machine Mixing," of the Standard Specifications is amended to read:

The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.

The seventh and eighth paragraphs in Section 90-6.03, "Transporting Mixed Concrete," of the Standard Specifications are amended to read:

When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours, or before 250 revolutions of the drum or blades, whichever comes first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30° C, or above, a time less than 1.5 hours may be required.

When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30° C, or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

The ninth and tenth paragraphs in Section 90-6.03, "Transporting Mixed Concrete," of the Standard Specifications are amended to read:

Each load of concrete delivered at the job site shall be accompanied by a ticket showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water (liters) added to the load and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This ticket shall also show the actual scale masses (kilograms) for the ingredients batched or the calculated portland cement concrete volume (cubic meters) calculated from actual scale masses. Theoretical or target batch masses shall not be used as a substitute for actual scale. When showing a calculated portland cement concrete volume on the delivery ticket, the Contractor shall maintain and have available a record of the following information for each batched load:

1. Mix identification number, specific to the contract.
2. Load number shall match the load number on the delivery ticket.
3. Date and time the load was batched.



4. Actual batch mass (kilograms) for each ingredient.
5. Any water (liters) added at the plant, in addition to the water proportioned for the batch.

When requested, the Contractor shall submit the recorded information for calculated portland cement concrete volumes to the Engineer. The information shall be provided in printed form, or if acceptable to the Engineer, data may be submitted in electronic media. Electronic media shall be presented in a tab delimited format on 90 mm diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be LFCR (one line, separate record) with allowances for sufficient fields to satisfy the amount of data required by these specifications.

Section 90-6.05, "Hand-Mixing," of the Standard Specifications is amended to read:

**90-6.05 Hand-Mixing.**—Hand-mixed concrete shall be made in batches not more than one-fourth cubic meter and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than 0.3 meters in total depth. On this mixture shall be spread the dry cement and mineral admixture and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

The table in the first paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

Type of Work	Nominal Penetration (mm)	Maximum Penetration (mm)
Concrete pavement	0-25	40
Non-reinforced concrete facilities	0-35	50
Reinforced concrete structures:		
Sections over 300 mm thick	0-35	65
Sections 300 mm thick or less	0-50	75
Concrete placed under water	75-100	115
Cast-in-place concrete piles	65-90	100

The second paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

The amount of free water used in concrete shall not exceed 180 kilograms per cubic meter, plus 20 kilograms for each required 100 kilograms of cementitious material in excess of 325 kilograms per cubic meter.

The fourth paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

Where there are adverse or difficult conditions which affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg of water per added 100 kg of cementitious material per cubic meter. The cost of additional

cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.

Section 90-9.01, "General," of the Standard Specifications is amended to read:

**90-9.01 General.**—Concrete compressive strength requirements consist of a minimum strength which must be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified elsewhere or are shown on the plans.

The compressive strength of concrete will be determined from test cylinders which have been fabricated from concrete sampled in accordance with California Test 539. Test cylinders will be molded and initial field cured in accordance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in accordance with California Test 521. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding, or testing, that cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.

When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in accordance with Method 1 of California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.

When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor's expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State \$14.00 for each in-place cubic meter of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State \$20.00 for each in place cubic meter of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. All concrete represented by a single test which indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials."

If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits



evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in accordance with the specifications of ASTM Designation: C 42.

No single compressive strength test shall represent more than 250 cubic meters.

When a pre-cast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders which have been handled and stored in accordance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.

When concrete is specified by compressive strength, pre-qualification of materials, mix proportions, mixing equipment, and procedures proposed for use, will be required prior to placement of the concrete. Pre-qualification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Pre-qualification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.

Certified test data, in order to be acceptable, must indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.

Trial batch test reports, in order to be acceptable, must indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches which were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

All tests shall be performed in accordance with either the appropriate California Test methods or the comparable ASTM test methods. All equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.

The certified test data and trial batch test reports shall include the following information:

- A. Date of mixing.
- B. Mixing equipment and procedures used.
- C. The size of batch in cubic meters and the mass, type and source of all ingredients used.
- D. Penetration of the concrete.
- E. The air content of the concrete if an air-entraining admixture is used.

F. The age at time of testing and strength of all concrete cylinders tested.

All certified test data and trial batch test reports shall be signed by an official of the firm which performed the tests.

When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.

After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional pre-qualification by testing of trial batches will be required prior to making any changes which, in the judgment of the Engineer, could result in a lowering of the strength of the concrete below that specified.

The Contractor's attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.

When pre-cast concrete members are manufactured at the plant of an established manufacturer of pre-cast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and pre-qualification of the materials, mix proportions, mixing equipment, and procedures will not be required.

Section 90-10.02A, "Portland Cement," of the Standard Specifications is renamed "Cementitious Material" and is amended to read:

**90-10.02A Cementitious Material.**—Cementitious material shall conform to the provisions in Section 90-1.01, "Description." Compressive strength requirements consist of a minimum strength which must be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified elsewhere or are shown on the plans.

The fifth paragraph in Section 90-10.02B, "Aggregate," of the Standard Specifications is deleted.  
Section 90-10.03, "Production," of the Standard Specifications is amended to read:

**90-10.03 Production.**—Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice, which will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and which conforms to requirements specified herein. "Recognized standards of good practice" are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or California Department of Transportation.

The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."

The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.

Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before any stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32° C. will be considered as conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.

The required mixing time in stationary mixers shall be not less than 50 seconds nor more than 5 minutes.

The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.

Each load of ready-mixed concrete shall be accompanied by a ticket which shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The ticket shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.

A Certificate of Compliance in accordance with the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets all contract requirements, including minimum cementitious material content specified.

The third and fourth paragraphs in Section 90-11.02, "Payment," of the Standard Specifications are amended to read:

Should the Engineer order the Contractor to incorporate any admixtures in the concrete when their use is not required by these specifications or the special provisions, furnishing the admixtures and adding them to the concrete will be paid for as extra work as provided in Section 4-1.03D.

Should the Contractor use admixtures as permitted under Sections 90-4.05, "Optional Use of Chemical Admixtures;" or 90-4.07, "Optional Use of Air-entraining Admixtures;" or should the Contractor request and obtain permission to use other admixtures for the Contractor's benefit, the Contractor shall furnish those admixtures and incorporate them in the concrete at the Contractor's expense and no additional compensation will be allowed therefor.

## **8-2.02 CEMENT AND WATER CONTENT**

The first paragraph following the table of penetration ranges in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

The amount of free water used in concrete shall not exceed  $183 \text{ kg/m}^3$ , plus 20 kg for each required 100 kg of cement in excess of  $325 \text{ kg/m}^3$ .

### 8-3.01 WELDING ELECTRODES

Flux core welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform any type of welding for this project.

### 8-3.02 WELDING QUALITY CONTROL

Welding quality control shall apply to the items of work described herein and shall conform to the requirements in the AWS welding codes, the Standard Specifications and these special provisions.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	1996
D1.4	1992
D1.5	1995
D1.5 (metric only)	1996

All requirements of the AWS welding codes shall apply unless specified otherwise in the Standard Specifications, on the plans or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or ANSI/AASHTO/AWS.

Except for steel piling, welding performed anywhere other than at a permanent fabrication facility that is certified under the AISC Quality Certification Program, Category III, Major Steel Bridges, shall conform to the provisions for welding quality control as specified herein. Welding of steel piling shall conform to the provisions in "Piling" elsewhere in these special provisions and to the provisions for welding quality control specified herein.

The welding of all fracture critical members (FCMs) shall conform to the provisions specified in the Fracture Control Plan (FCP) and herein.

Unless otherwise specified, when any type of welding is performed on items of work including 1) steel piles, 2) bar reinforcement, 3) steel structures, 4) column casings and 5) miscellaneous metal consisting of \_\_\_\_\_, the Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of all welding, including materials and workmanship, performed by the Contractor and all subcontractors.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

No welding inspection personnel or nondestructive testing (NDT) firms to be used in the work shall be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project.

The QCM shall be the sole individual responsible to the Contractor for submitting and receiving all correspondence and required submittals and reports regarding welding to and from the Engineer.

Prior to submitting the Quality Control Plan (QCP) required herein, a pre-welding meeting shall be held between the Engineer, Contractor and any welding subcontractors to be used in the work to discuss the requirements for the QCP.

Prior to performing any welding, the Contractor shall submit to the Engineer, in accordance with the provisions of Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate QCP for each item of work for which welding is to be performed. As a minimum, each QCP shall include the following:

1. The name of the welding firm and the NDT firm to be used;
2. A manual prepared by the NDT firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT firm, and the names, qualifications and documentation of certifications for all personnel to be used;
3. The name of the QCM and the names, qualifications and documentation of certifications for all Quality Control (QC) Inspectors and Assistant Quality Control Inspectors to be used;
4. An organizational chart showing all QC personnel and their assigned QC responsibilities;
5. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including:
  - (a) all visual inspections;
  - (b) all NDT including radiographic geometry, penetrameter and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports; and
  - (c) calibration procedures and calibration frequency for all NDT equipment;
6. A system for the identification and tracking of all welds, NDT and any required repairs, and a procedure for the reinspection of any repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld and 2) placing all identification and tracking information on each radiograph;
7. Standard procedures for performing non-critical repair welds. Non-critical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, rollover or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size;
8. The welding procedure specification (WPS), including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness;
9. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness; and
10. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department.

The Engineer shall have 10 working days to review the QCP submittal after a complete plan has been received. No welding shall be performed until the QCP is approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the QCP, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended QCP or addendum shall be submitted to, and approved in writing by the Engineer, for any proposed revisions to the approved QCP. An amended QCP or addendum will be required for any revisions to the QCP, including but not limited to a revised WPS, additional welders, changes in NDT firms or procedures, QC or NDT personnel, or updated systems for tracking and identifying welds. The Engineer shall have 3 working days to complete the review of the amended QCP or addendum. Work that is affected by any of the proposed revisions shall not be performed until the amended QCP or addendum has been approved. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the amended QCP or addendum, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

After final approval of the QCP, amended QCP or addendum, the Contractor shall submit to the Engineer 7 copies each of these approved documents.

A daily production log for welding shall be kept by the QCM for each day that welding is performed. The log shall clearly indicate the locations of all welding, and shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each Quality Control Inspector shall also be included in the log.

It is expressly understood that the Engineer's approval of the Contractor's QCP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications. The Engineer's approval shall not constitute a waiver of any of the requirements of the plans and specifications nor relieve the Contractor of any obligation thereunder, and defective work, materials and equipment may be rejected notwithstanding approval of the QCP.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 7 days following the performance of any welding:

1. Reports of all visual weld inspections and NDT;
2. Radiographs and radiographic reports, and other required NDT reports;
3. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests, corrected all rejectable deficiencies, and all repaired welds have been reexamined by the required NDT and found acceptable; and
4. Daily production log.

All reports regarding NDT, including radiographs, shall be signed by both NDT technician and the person that performed the review, and then submitted directly to the QCM for review and signature prior to submittal to the Engineer. Corresponding names shall be clearly printed or typewritten next to all signatures.



The Engineer shall review the Welding Report to determine if the Contractor is in conformance with the QCP. Except for steel piling, the Engineer shall be allowed 7 days to review the report and respond in writing after a complete Welding Report has been received. The review time for steel piling shall be as specified in "Piling" elsewhere in these special provisions. Prior to receiving notification from the Engineer of the Contractor's conformance with the QCP, the Contractor may encase in concrete or cover any welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover any welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Sections 6.1.1 through 6.1.3.3 of AWS D 1.1, Sections 7.1.1 and 7.1.2 of AWS D 1.4, and Sections 6.1.1.1 through 6.1.3.3 of AWS D 1.5 are replaced with the following:

Quality Control (QC) shall be the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to welding, during welding and after welding as specified in this section and additionally as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

The Quality Control (QC) Inspector shall be the duly designated person who performs inspection, testing, and quality matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

All QC Inspectors shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as AWS Certified Welding Inspectors (CWI) in accordance with the provisions of AWS QC1, "Standard and Guide for Qualification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in accordance with the provisions of AWS QC1, "Standard and Guide for Qualification of Welding Inspectors," or has equivalent qualifications. The QC Inspector shall monitor the Assistant QC Inspector's work, and shall be responsible for signing all reports.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

Section 6.14.7, "Personnel Qualification," of AWS D 1.1, Section 7.7.6, "Personnel Qualification," of AWS D 1.4 and Section 6.1.3.4, "Personnel Qualification," of AWS D 1.5 are amended to read:

Personnel performing NDT shall be qualified in accordance with the current edition of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. Only individuals who are 1) qualified for NDT Level II, or 2)

Level III technicians who have been directly certified by the ASNT and are authorized to perform the work of Level II technicians, shall perform NDT, review the results, and prepare the written reports.

Section 6.5.4, "Scope of Examination," of AWS D 1.1 and Section 7.5.4 of AWS D 1.4 are amended to read:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved WPS are met.

Section 6.5.4 of AWS D 1.5 is amended to read:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved WPS are met. The QC Inspector shall examine the work to make certain that it meets the requirements of section 3 and 9.21. The size and contour of welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, Quality Control Inspector, or NDT personnel to specified levels by retests or other means.

A sufficient number of QC Inspectors shall be provided to ensure continuous inspection when any welding is being performed. Continuous inspection, as a minimum, shall include (1) having QC Inspectors continually present on all shifts when any welding is being performed, or (2) having a QC Inspector within such close proximity of all welding operations that inspections by the QC Inspector of each operation, at each welding location, shall not lapse for a period exceeding 30 minutes.

Inspection and approval of the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day that welding is performed.

The QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for non-critical weld repairs, base metal repairs, or any other type of repairs not submitted in the QCP, the Engineer shall be notified immediately in writing when any welding problems or deficiencies are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the proposed repair procedures, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When joint details that are not prequalified by the applicable AWS codes are proposed for use in the work, all welders using these details shall perform a qualification test plate using the approved WPS variables and the joint detail to be used in production. The test plate shall be the maximum thickness to



be used in production. The test plate shall be mechanically or radiographically tested as directed by the Engineer. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

The period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. A valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's work remains satisfactory.

All qualification tests for welders, welding operators, and WPSs used in welding operations will be witnessed by the Engineer or an independent third party acceptable to the Engineer.

Section 6.6.5, "Nonspecified Nondestructive Testing Other Than Visual," of AWS D 1.1, Section 6.6.5 of AWS D 1.4 and Section 6.6.5 of AWS D 1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS welding codes, in the Standard Specifications or in these special provisions. Additional NDT required by the Engineer, will be paid for as extra work in accordance with Section 4-1.03D, "Extra Work," of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, the cost of the testing will not be paid for as extra work, and shall be at the Contractor's expense.

All required repair work to correct welding deficiencies, whether discovered by the required visual inspection or NDT, or by additional NDT directed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

At the completion of all welding, the QCM shall sign and furnish to the Engineer, a certificate of compliance in accordance with Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in accordance with the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

Full compensation for conforming to all of the requirements of this section, Welding Quality Control, shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

#### 8-4.01 INFILTRATION TRENCH ROCK

The following specification sets forth the requirements for rock and gravel for infiltration trench rock material. All rock products shall be non-crushed, pre-washed, clean, hard, sound, durable, uniform in quality, and free of any detrimental quantity of soft, friable, thin, elongated or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substances.

The material shall contain no more than 50 percent of particles having one or more fractured faces.

<u>Percentage Passing</u>		
<u>Sieve Size</u>	<u>Operating Range</u>	<u>Contract Compliance</u>
75 mm	90—100	100
38 mm	35—60	87—100
25 mm	10—30	30—65
19 mm	2—9	0—12

<u>Sieve Size</u>	<u>Percent Passing</u>
<u>100 mm</u>	<u>100</u>
<u>75 mm</u>	<u>75</u>
<u>50 mm</u>	<u>8</u>
<u>38 mm</u>	<u>2</u>

#### 8-4.02 DISSIPATOR AND FLOW SPREADER ROCK

The following specification sets forth the requirements for rock and gravel for filling in the Biofiltration Swale Energy Dissipators and Flow Spreaders. All rock products shall be non-crushed, pre-washed, clean, hard, sound, durable, uniform in quality, and free of any detrimental quantity of soft, friable, thin, elongated or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substances.

The material shall contain no more than 50 percent of particles having one or more fractured faces.

<u>Sieve Size</u>	<u>Percent Passing</u>
<u>100 mm</u>	<u>100</u>
<u>75 mm</u>	<u>75</u>
<u>50 mm</u>	<u>8</u>
<u>38 mm</u>	<u>2</u>

## **10-1.00 CONSTRUCTION PROJECT FUNDING IDENTIFICATION SIGNS**

Before any major physical construction work readily visible to highway users is started on this contract, the Contractor shall furnish and erect 6 Type 2 Construction Project Funding Identification Signs at the locations designated by the Engineer.

The signs shall be of a type and material consistent with the estimated time of completion of the project and shall conform to the details shown on the plans.

The sign letters, border and Caltrans construction logo shall conform to the colors and details shown on the plans and shall be on a white background (non-reflective). The colors blue (PR Color No. 3) and orange (PR Color No. 6) shall conform to the PR Color number specified by the Federal Highway Administration's Color Tolerance Chart. The highway route shields shall be for Federal Interstate Routes 5 and 605. The highway route shields will be State-furnished as provided under "Materials" elsewhere in these special provisions.

The sign messages to be used for the types of funding involved shall consist of the following in the order shown:

### **STATE HIGHWAY FUNDS**

The letter sizes to be used shall be as shown on the plans. The information shown on the signs shall be limited to that shown on the plans.

The signs shall be kept clean and in good repair by the Contractor.

Upon completion of the work, the signs shall be removed and disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the construction project funding identification signs shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

## **10-1.01 ORDER OF WORK**

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

At locations exposed to public traffic where guard railings or barriers are to be constructed, reconstructed, or removed and replaced, the Contractor shall schedule the operations so that at the end of each working day there shall be no post holes open nor shall there be any railing or barrier posts installed without the blocks and rail elements assembled and mounted thereon.

## **10-1.02 WATER POLLUTION CONTROL**

Water pollution control work shall conform to the requirements in Section 7-1.01G, "Water Pollution," of the Standard Specifications, and these special provisions.

Water pollution control work shall conform to the requirements in the Construction Contractor's Guide and Specifications of the Caltrans Storm Water Quality Handbooks, dated April 1997, and addenda thereto issued up to and including the date of advertisement of the project, hereafter referred to as the "Handbook." Copies of the Handbook may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.

The Contractor shall become fully informed of, and comply with the applicable provisions of the Handbook and Federal, State and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction.

Unless arrangements for disturbance of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility to the Contractor or property owner whatsoever with respect to any arrangements made between the Contractor and property owner to allow disturbance of areas outside the project limits.

The Contractor shall be responsible for the costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section "Water Pollution Control" including, but not limited to, compliance with the applicable provisions of the Handbook and Federal, State and local regulations. For the purposes of this paragraph, costs and liabilities include but are not limited to fines, penalties and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to any remedy authorized by law, so much of the money due the Contractor under the contract that shall be considered necessary by the Department may be retained by the State of California until disposition has been made of the costs and liabilities.

The retention of money due the Contractor shall be subject to the following:

1. The Department will give the Contractor 30 days notice of its intention to retain funds from any partial payment which may become due to the Contractor prior to acceptance of the contract. Retention of funds from any payment made after acceptance of the contract may be made without prior notice to the Contractor.
2. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
3. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained at the legal rate of interest for the period of the retention.

Conformance with the requirements of this section "Water Pollution Control," shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 7-1.11, "Preservation of Property," and Section 7-1.12, "Responsibility for Damage," of the Standard Specifications.

**WATER POLLUTION CONTROL PROGRAM PREPARATION, APPROVAL AND UPDATES.**—As part of the water pollution control work, a Water Pollution Control Program, hereafter

referred to as the "WPCP," is required for this contract. The WPCP shall conform to the requirements in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Handbook, and these special provisions.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the WPCP has been approved by the Engineer.

Within 15 days after the approval of the contract, the Contractor shall submit 3 copies of the WPCP to the Engineer. The Contractor shall allow 3 days for the Engineer to review the WPCP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the WPCP within 3 days of receipt of the Engineer's comments and shall allow 3 days for the Engineer to review the revisions. Upon the Engineer's approval of the WPCP, 3 additional copies of the WPCP incorporating the required changes shall be submitted to the Engineer. Minor changes or clarifications to the initial submittal may be made and attached as amendments to the WPCP. In order to allow construction activities to proceed, the Engineer may conditionally approve the WPCP while minor revisions or amendments are being completed.

The objectives of the WPCP shall be to identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and to identify, construct, implement and maintain water pollution control measures, hereafter referred to as control measures, to reduce to the extent feasible pollutants in storm water discharges from the construction site during construction under this contract.

The WPCP shall incorporate control measures in the following categories:

1. Soil stabilization practices;
2. Sediment control practices;
3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Nonstorm water management and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of control measures are contained in the Handbook.

The Contractor shall consider the objectives and minimum requirements presented in the Handbook for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate into the WPCP and implement on the project, one or more of the listed minimum controls required in order to meet the pollution control objectives for the category. In addition, the Contractor shall consider other control measures presented in the Handbook and shall incorporate into the WPCP and implement on the project the control measures necessary to meet the objectives of the WPCP. The Contractor shall document the selection process in accordance with the procedure specified in the Handbook.

The WPCP shall include, but not be limited to, the following items as described in the Handbook:

1. Project description and Contractor's certification;
2. Project information;
3. Pollution sources, control measures, and water pollution control drawings; and
4. Amendments, if any.

The Contractor shall amend the WPCP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems, or when deemed necessary by the Engineer. The WPCP shall also be amended if the WPCP has not achieved the objective of reducing pollutants in storm water discharges. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initially approved WPCP, which are required on the project to control water pollution effectively. Amendments to the WPCP shall be submitted for review and approval by the Engineer in the same manner specified for the initially approved WPCP. Amendments shall be dated and attached to the on-site WPCP document.

The Contractor shall keep a copy of the WPCP, together with updates, revisions and amendments at the project site.

**WPCP IMPLEMENTATION.**—Upon approval of the WPCP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting and maintaining the control measures included in the WPCP and any amendments thereto and for removing and disposing of temporary control measures. Unless otherwise directed by the Engineer or specified in these special provisions, the Contractor's responsibility for WPCP implementation shall continue throughout any temporary suspension of work ordered in accordance with Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal and disposal of control measures are specified in the Handbook and these special provisions.

Soil stabilization practices and sediment control measures, including minimum requirements, shall be provided throughout the winter season, defined as between November 1 and March 15.

Implementation of soil stabilization practices and sediment control measures for soil-disturbed areas of the project site shall be completed, except as provided for below, no later than 20 days prior to the beginning of the winter season or upon start of applicable construction activities for projects which begin either during or within 20 days of the winter season.

Throughout the winter season, the active, soil-disturbed area of the project site shall be less than 2 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active, soil-disturbed area limit. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control measures to protect soil-disturbed areas of the project site before the onset of precipitation. The Contractor shall maintain a quantity of soil stabilization and sediment control materials on site equal to \*125 percent of that sufficient to protect unprotected, soil-disturbed areas on the project site and shall maintain a detailed plan for the mobilization of sufficient labor and equipment to fully deploy control measures required to protect unprotected, soil-disturbed areas on the project site prior to the onset of precipitation. The Contractor shall include a current inventory of control measure materials and the detailed mobilization plan as part of the WPCP.

Throughout the winter season, soil-disturbed areas of the project site shall be considered to be nonactive whenever soil disturbing activities are expected to be discontinued for a period of 20 or more days and the areas are fully protected. Areas that will become nonactive either during the winter season or within 20 days thereof shall be fully protected with soil stabilization practices and sediment control measures within 10 days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

Throughout the winter season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control measures unless fair weather is predicted through the following work day. The weather forecast shall be monitored by the Contractor on a daily basis. The National Weather Service forecast shall be used, or an alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted prior to the end of the following work day, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning control measures prior to the onset of the precipitation.

The Contractor shall implement, year-round and throughout the duration of the project, control measures included in the WPCP for sediment tracking, wind erosion, nonstorm water management and waste management and disposal.

The Engineer may order the suspension of construction operations which create water pollution if the Contractor fails to conform to the requirements of this section "Water Pollution Control" as determined by the Engineer.

**MAINTENANCE.**—To ensure the proper implementation and functioning of control measures, the Contractor shall regularly inspect and maintain the construction site for the control measures identified in the WPCP. The Contractor shall identify corrective actions and time frames to address any deficient measures or reinitiate any measures that have been discontinued.

The construction site inspection checklist provided in the Handbook shall be used to ensure that the necessary measures are being properly implemented, and to ensure that the control measures are functioning adequately. The Contractor shall submit one copy of each site inspection record to the Engineer.

During the winter season, inspections of the construction site shall be conducted by the Contractor to identify deficient measures, as follows:

1. Prior to a forecast storm;
2. After all precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. Routinely, at a minimum of once every 2 weeks.

If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified control measure, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the State.

**PAYMENT.**—Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Those control measures which are shown on the project plans and for which there is a contract item of work will be measured and paid for as that item of work.



The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during estimate periods in which the Contractor fails to conform to the requirements of this section "Water Pollution Control" as determined by the Engineer.

Retentions for failure to conform to the requirements of this section "Water Pollution Control" shall be in addition to the other retentions provided for in the contract. The amounts retained for failure of the Contractor to conform to the requirements of this section will be released for payment on the next monthly estimate for partial payment following the date that a WPCP has been implemented and maintained, and water pollution is adequately controlled, as determined by the Engineer.

### **10-1.03 PRESERVATION OF PROPERTY**

Attention is directed to the provisions in Section 7-1.11, "Preservation of Property," and to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Existing trees, shrubs and other plants, that are not to be removed as directed by engineer, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be No. 15 container and the minimum size of shrub replacement shall be No. 15 container. Replacement ground cover plants shall be from flats and shall be planted 300 mm on center. Replacement of Carpobrotus ground cover plants shall be from cuttings and shall be planted 300 mm on center. Replacement planting shall conform to the requirements in Section 20-4.07, "Replacement," of the Standard Specifications.

Damaged or injured plants shall be removed and disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications. At the option of the Contractor, removed trees and shrubs may be reduced to chips. The chipped material shall be spread within the highway right of way at locations designated by the Engineer.

Replacement planting of injured or damaged trees, shrubs and other plants shall be completed not less than 20 working days prior to acceptance of the contract. Replacement plants shall be watered as necessary to maintain the plants in a healthy condition.

### **10-1.04 OBSTRUCTIONS**

Attention is directed to Sections 8-1.10, "Utility and Non-Highway Facilities," and 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

Excavation in areas requiring regional notification center investigation shall not be commenced until all utilities in these areas have been located and identified.

Power equipment may be used for excavating construction area sign postholes if it is determined that there are no utility facilities within 1.2 m (4 feet) of the proposed post holes.



### 10-1.05 CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in accordance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Obstructions" elsewhere in these special provisions.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

Type IV reflective sheeting for sign panels for portable construction area signs shall conform to the requirements specified under "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

### 10-1.06 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the Section entitled "Portable Changeable Message Signs" and "Public Safety", "Temporary Traffic Screen" elsewhere in these special provisions, and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Lane closures shall conform to the provisions in the section of these special provisions entitled "Traffic Control System for Lane Closure."

In addition to the provisions set forth in "Public Safety", elsewhere in these special provisions, whenever work to be performed on the freeway traveled way (except the work of installing, maintaining, and removing traffic control devices) is within 1.8 m of the adjacent traffic lane, the adjacent traffic lane shall be closed.

Personal vehicles of the Contractor's employees shall not be parked within the freeway right of way.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic

through the area and shall make all arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

Freeway lanes shall be closed only during the hours shown on Charts 1, 2, and 3 included in this section "Maintaining Traffic." Except work required under Sections 7-1.08 and 7-1.09, work that interferes with public traffic shall be performed only during the hours shown for lane closures.

The contractor may be allowed to work during the hours designated as "No freeway lane closure permitted; no work permitted..." shown on Charts 1, 2, and 3 provided temporary traffic screens are installed on top of temporary railings (type K), as shown on the plans, or contractor furnished temporary railings (type K) Temporary traffic screens and contractor furnished temporary railings (type K) shall be furnished, installed, maintained, and removed at the contractor's expense.

Freeway connectors may be closed in accordance with the hours and requirements shown on Table A.

The Contractor shall provide the following minimum advance notification in writing before the actual; closure to the Engineer for any closure:

<u>LOCATION</u>	<u>MINIMUM ADVANCE NOTIFICATION</u>
Freeway Lane	3 days
Complete Connector Closure	7days

Closures will not be allowed if the contractor fails to provide the minimum advance notification to the Engineer as stated above. All closures shall conform to the requirements set forth elsewhere in these special provisions.

Special advance notice publicity signs (sign SP-1), as shown on the plans shall be posted as directed by the Engineer, a minimum of 7 days prior to the actual connector closure.

Furnishing, erecting, maintaining, and removing special portable freeway detour signs (sign SP-2) along the detour routes as directed by the Engineer shall be paid for as extra work as provided in section 4-1.03D of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing special advance notice publicity signs shall be considered as included in the contract lump sum price paid for traffic control system and no additional payment will be made therefor.

All aforementioned special signs shall become the property of the Contractor at the conclusion of this project and shall be removed from the worksite.

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When November 11th falls on a Saturday, the preceding Friday shall be a designated legal holiday.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor if in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved them in writing. All other modifications will be made by contract change order.

Ramps may be closed only if signed for closing 3 days in advance. The Contractor shall notify the Engineer not less than 5 calendar days prior to signing the ramp. If the ramp is not closed on the posted day, the closure shall be changed to allow 3 days advance notice before closure.

Consecutive on-ramps or off-ramps in the same direction of travel shall not be closed simultaneously unless otherwise provided in these special provisions or permitted by the Engineer.

### LANE CLOSURE CHART NO. 1

DIRECTION : South					LOCATION : Route 5 Freeway at Route 605 Freeway																									
NO. OF LANES : 3					LANE REQUIREMENTS AND HOURS OF WORK																									
					AM												PM													
FROM HOUR TO HOUR					12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Mondays through Thursdays					2	1	1	1	2																		2	2	2	
Fridays					2	1	1	1	2																			2	2	
Saturdays					2	2	1	1	1	2	2	2	2														2	2	2	
Sundays					2	2	1	1	1	2	2	2	2	2	2													2	2	2
Day before designated legal holiday					2	1	1	1	2		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Designated legal holidays					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Legend:

- 1** Provide at least one freeway lane open in direction of travel.
- 2** Provide at least two adjacent lanes open in direction of travel.
- No freeway lane closure permitted; work permitted anywhere that does not require freeway lane closure.
- X** No freeway lane closure permitted; no work permitted on south roadway.

### LANE CLOSURE CHART NO. 2

DIRECTION : North		LOCATION : Route 605 Freeway; Carson St. UC to Del Amo Blvd UC																								
NO. OF LANES : 4		LANE REQUIREMENTS AND HOURS OF WORK																								
		AM												PM												
FROM HOUR TO HOUR		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays		2	2	2	2	2																	3	3	3	2
Fridays		2	2	2	2	2																		3	3	2
Saturdays		2	2	2	2	2	2	2	3	3													3	3	3	2
Sundays		2	2	2	2	2	2	3	3	3	3	3											3	3	2	2
Day before designated legal holiday		2	2	2	2	2		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Designated legal holidays		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Legend:

- 2** Provide at least two adjacent lanes open in direction of travel.
- 3** Provide at least three adjacent lanes open in direction of travel.
- No freeway lane closure permitted; work permitted anywhere that does not require freeway lane closure.
- X** No freeway lane closure permitted; no work permitted on east roadway.

### LANE CLOSURE CHART NO. 3

DIRECTION : North		LOCATION : Route 605 Freeway at Route 91 Freeway																										
NO. OF LANES : 4		LANE REQUIREMENTS AND HOURS OF WORK																										
		AM												PM														
FROM HOUR TO HOUR		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
Mondays through Thursdays		2	2	2	2	2																	3	3	3	2		
Fridays		2	2	2	2	2																		3	3	2		
Saturdays		2	2	2	2	2	2	2	3	3													3	3	3	2		
Sundays		2	2	2	2	2	2	3	3	3	3	3											3	3	2	2		
Day before designated legal holiday		2	2	2	2	2		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
Designated legal holidays		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Legend:

- 2** Provide at least two adjacent lanes open in direction of travel.
- 3** Provide at least three adjacent lanes open in direction of travel.
- No freeway lane closure permitted; work permitted anywhere that does not require freeway lane closure.
- X** No freeway lane closure permitted; no work permitted on east roadway.

**TABLE A**

**PERMISSIBLE HOURS OF CONNECTOR CLOSURES,  
CLOSURE REQUIREMENTS AND DETOUR ROUTES**

<b>Freeway to Freeway Connector</b>	<b>Weekdays</b>	<b>Friday Nights Through Saturdays</b>	<b>Saturday Nights Through Sundays</b>
S/B 5 to S/B 605	9:00 pm - 6:00 am	9:00 pm - 11:00 am	8:00 pm - Noon
Detour traffic south on Route 5 fwy. to exit and re-enter N/B Route 5 fwy. Via off- and on-ramps at Pioneer Ave. Place a PCMS on the right shoulder of S/B Route 5 fwy. At Lakewood Blvd. on-ramp with the message, "SOUTH 605 / EXIT / CLOSED - DETOUR / USE / PIONEER".			
S/B 5 to N/B 605	9:00 pm - 6:00 am	9:00 pm - 11:00 am	8:00 pm - Noon
Detour traffic south on Route 5 fwy. to exit and re-enter N/B Route 5 fwy. Via off- and on-ramps at Pioneer Ave. Place a PCMS on the right shoulder of S/B Route 5 fwy. At Lakewood Blvd. on-ramp with the message, "NORTH 605 / EXIT / CLOSED - DETOUR / USE / PIONEER".			
E/B 91 to N/B 605	9:00 pm - 6:00 am	9:00 pm - 11:00 am	8:00 pm - Noon
Detour traffic south on Route 605 fwy. to exit and re-enter N/B Route 605 fwy. Via off- and on-ramps at South St. Place a PCMS on the right shoulder of E/B Route 91 fwy. At Bellflower Blvd on-ramp with the message, "NORTH 605 / EXIT / CLOSED - DETOUR / USE / SOUTH 605".			

PCMS = Portable Changeable message Sign

**10-1.07 PORTABLE CHANGEABLE MESSAGE SIGN**

Portable changeable message signs shall be furnished, placed, operated, and maintained at locations provided for in these special provisions and shall conform to the provisions of Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to Table A in "Maintaining Traffic" of these special provisions concerning the use and locations of the portable changeable message signs.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing, transporting from location to location, and removing the portable changeable message signs as specified in these special provisions shall be considered as included in the contract lump sum price paid for traffic control system and no additional payment will be made therefor.

#### **10-1.08 TEMPORARY RAILING**

Temporary railing (Type K) shall be placed at the locations shown on the plans, specified in these special provisions or in the Standard Specifications or ordered by the Engineer, and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Temporary railing (Type K) fabricated prior to January 1, 1993, with one longitudinal No. 15 (No. 5 imperial) reinforcing steel bar near the top in lieu of the 2 longitudinal No. 15 reinforcing steel bars near the top, as shown on the plans, may be used provided vertical holes are not drilled in the top of the temporary railing to secure temporary traffic screen to the temporary railing.

The Contractor's attention is directed to the provisions in "Public Safety" and "Order of Work" elsewhere in these special provisions.

Temporary railing (Type K) placed in accordance with the provisions in "Public Safety" elsewhere in these special provisions will not be measured nor paid for.

Full compensation for reflectors and adhesive for temporary railing (Type K) shall be considered as included in the contract price paid for temporary railing (Type K) and no separate payment will be made therefor.

#### **10-1.09 CHANNELIZERS**

Channelizers shall be surface mounted type and shall be furnished, placed and maintained at the locations shown on the plans and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials," elsewhere in these special provisions.

Channelizer posts shall be orange in color.

Full compensation for removing and disposing of underlying adhesive shall be considered as included in the contract unit price paid for channelizers and no separate payment will be made therefor.

#### **10-1.10 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE**

A traffic control system shall consist of closing traffic lanes and ramps in accordance with the details shown on the plans, the provisions of Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" elsewhere in these special provisions and these special provisions.

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take the measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining, and removing, of components of a traffic control system, and shall be in place before a lane closure requiring its use is completed.

If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace the component and shall restore the component to its original location.

When lane and ramp closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, approved by the Engineer, within the limits of the highway right of way.

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor, materials (including signs), tools, equipment and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications, shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work, and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

#### **10-1.11 TEMPORARY CRASH CUSHION MODULE**

This work shall consist of furnishing, installing and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, specified in the special provisions or directed by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in accordance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety" and "Temporary Railing" of these special provisions.

**GENERAL.**—Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

**MATERIALS.**—At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite Inertial Modules, Fitch Inertial Modules or equal:

Energite Inertial Modules manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.

Distributor(Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX (916) 387-9734

Distributor(Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274.

Fitch Inertial Modules, national distributor; Roadway Safety Service, Inc., 700-3 Union Parkway, Ronkonkoma, NY 11779.

Distributor: Singletree Sales Company, 1533 Berger Drive, San Jose, CA 95112, Telephone 1-800-822-7735.

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified above may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in accordance with the manufacturer's directions, and to the sand capacity in kilograms for each module as shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water, as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.



**INSTALLATION.**—Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods approved by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in permanent work.

#### **10-1.12 EXISTING HIGHWAY FACILITIES**

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

#### **10-1.13 REMOVE DRAINAGE FACILITIES**

Existing pipe, inlets and headwalls, where any portion of these structures is within one meter of the grading plane in excavation areas, or within 0.3-m of original ground in embankment areas, or where shown on the plans to be removed, shall be completely removed and disposed of.

Where shown on the plans, existing pipes shall be removed and disposed of.

Pipes shall not be removed until their use is no longer required. The contractor shall notify the Engineer in advance of any intended pipe abandonment.

The contract price per meter for remove pipe shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in remove pipe, including structure excavation and structure backfill, as shown on the plans, as specified in the Standard Specifications, and as directed by the Engineer.

#### **10-1.14 REMOVE ASPHALT CONCRETE DIKE**

Existing asphalt concrete dike, where shown on the plans to be removed, shall be removed.

Prior to removing the dike, the outside edge of the asphalt concrete to remain in place shall be cut to a neat line. The cut shall be a minimum depth of 50 mm.

The dike shall be removed in such a manner so that the surfacing which is to remain in place is not damaged.

The dike shall be disposed of outside the highway right of way. The disposal shall conform to the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### **10-1.15 REMOVE CHAIN LINK FENCE**

Existing chain link fence shall be removed as shown on the plans.

#### **10-1.16 CLEARING AND GRUBBING**

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

The contractor shall separate soil from vegetation, and the soils will remain on the site.

All activities controlled by the Contractor, except clean up or other required work, shall be confined within the graded areas of the roadways.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 1.5 meters outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed, shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

#### **10-1.17 EARTHWORK**

Earthwork and excavations shall conform to the provisions in Section 19, "Earthwork," and Section 5-102A "Trench Excavation Safety Plans" of the Standard Specifications and these special provisions.

1. The contractor shall construct the infiltration surfaces, minimizing the use of heavy equipment. Any equipment driven on the infiltration surface should have extra wide ( " low pressure") treads or tires. The contractor shall prevent unnecessary equipment from entering the area of the infiltration surfaces. The contractor shall deeply till the infiltration surfaces after final grading, to provide a well- aerated, highly porous surface texture.
2. The contractor shall protect the infiltration surfaces during construction to prevent sediment from entering the infiltration system.
3. The contractor shall place excavated material at a minimum of 5 meters away from the infiltration zone.

4. The contractor shall ensure that there are no foreign objects such as tree roots protruding from the bottom or the walls of the infiltration facility.
5. The contractor shall have confirmation from the Resident Engineer that the soil conditions at design grade, when arrived at, are suitable and expected for the infiltration facility prior to proceeding with the construction of the facility.
6. The contractor shall remove all shoring from the infiltration trench without damaging the filter fabric. Following removal, the shoring remains the property of the contractor.

Full compensation for earth swale shall be considered as included in the contract price paid per cubic meter for imported borrow.

Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Where a portion of existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 50 mm before removing the surfacing. Full compensation for cutting existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

#### **10-1.18 EROSION CONTROL (TYPE D)**

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control (Type D) work shall consist of applying erosion control materials to embankment and excavation slopes 1:4 (vertical:horizontal) or steeper, and all disturbed areas and other areas designated by the Engineer. Erosion control (Type D) shall be applied during the period starting October 1 and ending April 1; or, if the slope on which the erosion control is to be placed is finished during the winter season as specified in "Water Pollution Control" elsewhere in these special provisions the erosion control shall be applied immediately; or, if the slope on which the erosion control is to be placed is finished outside both specified periods and the contract work will be completed before October 1, the erosion control shall be applied as a last item of work.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials and other debris shall be removed from areas to receive erosion control.

**MATERIALS.**—Materials shall conform to Section 20-2, "Materials," of the Standard Specifications and the following:

**SEED.**—Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed technologist certified by the Society of Commercial Seed Technologists.

Seed shall have been tested for purity and germination not more than one year prior to application of seed.

Results from testing seed for purity and germination shall be furnished to the Engineer prior to applying seed.

Erosion control seed shall consist of the following:

#### EROSION CONTROL SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms pure live seed per hectare (Slope measurement)
Trifolium Willdenovii (Tomcat Clover)	-	3.4
Vulpia Microstachys (Zorro Grass)	-	5.6
Lotus Scoparius (Deerweed)	-	3.4
Hordeum Californicum (California Barley)	-	11.2
Hordeum Vulgare (Barley)	-	10.1
Eschscholzia Californica (California Poppy)	-	2.2
Lupinus Bicolor (Miniature Lupine)	-	4.5
Nassella Pulchra (Purple Needlegrass)	-	4.5
Bromus Carinatus "Cucamonga" (Brome Grass)	-	2.2
Encelia Californica (California Encelia)	-	2.2

**BMP SEED.** BMP seed shall consist of the following:

**BMP SEED**

Botanical Name (Common Name)	Percent Purity/Percent Germination (Minimum)	Kilograms pure live Seed per Hectare (Slope measurement)	Container Plant Spacing and Container Size/Type
<del>Bromus carinatus</del> (California Brome)	95/80	6.7	
Distichlis spicata (Saltgrass)			300 mm on-center spacing of "plugs" from cut-up flats 406 mm square flats
<del>Deschampsia caespitosa</del> (Tufted hairgrass)	80/60	1.1	
<del>Hordeum brachyantherum</del> (Meadow barley)	90/80	5.6	
<del>Lupinus bicolor</del> (Pygmy leaf lupine)	98/80	3.4	
Nasella lepida (Foothill needlegrass)			300 mm on-center spacing of groove tubes (50 mm deep x 19 mm wide
Nassella pulchra (Purple needlegrass)			300 mm on-center spacing of groove tubes (50 mm deep x 19 mm wide
<del>Trifolium wildenovii</del> (Tomeat clover)	95/75	1.7	

Seed shall be delivered to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag will not be accepted.

A sample of approximately 30 g of seed will be taken from each seed container by the Engineer.

**COMMERCIAL FERTILIZER.**—Commercial fertilizer shall conform to the provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis range of 16 - 20 percent nitrogen, 7 - 10 percent phosphoric acid and 5 - 12 percent water soluble potash.

**COMPOST** - Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products, or a class A, exceptional quality biosolids compost, as required by US EPA, 40 CFR, part 503c regulations, or a combination of green material and biosolids compost. The compost shall be pocked or completed to reduce weed seeds and deleterious material and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life. Other deleterious material

such as plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 57 degrees Celsius shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of five times during the composting process, and shall go through a minimum of 90 days curing period after the 15 day thermolitic compost process has been completed. The compost shall have a minimum maturity level of seven as measured on a Slovia test kit. Compost shall be screened through a minimum 6.4 mm screen

The moisture content of the compost shall not exceed 25%. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal compost with a maximum moisture content of 25%.

Compost shall be prepackaged by the manufacturer and delivered to the project site in unopened bags.

**STRAW.**—Straw shall be derived from rice.

**STABILIZING EMULSION .**—Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

The requirement of an effective life of at least one year for stabilizing emulsion shall not apply.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil binder.

**APPLICATION.**—Erosion control materials shall be applied in 3 separate applications in the following sequence:

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

Material	Kilograms per hectare (Slope measurement)
Fiber	350
Non-Legume Seed	12
Legume Seed	2
Compost	1500

Straw shall be applied at the rate of 4.0 tonnes per hectare based on slope measurements. Incorporation of straw will not be required.

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Kilograms per hectare (Slope measurement)
Fiber	350
Commercial fertilizer	100
Stabilizing emulsion (solids)	450
Compost	1500

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

Once straw work is started in an area, the remaining applications shall be completed in that area on the same working day.

The proportions of erosion control materials may be changed by the Engineer to meet field conditions.

BMP seed materials shall be applied in the following sequence:

1. The topsoil should be level, compacted, and moist enough to resist shifting. The surface on which the flats are to be laid should be firm and free from footprints or other depressions.
2. Exercise caution when removing the sod from the flats to avoid breakage and root damage. This may be accomplished by turning the flat over onto an empty upside down flat, then turning the upside down flat onto another upside down flat, then sliding off the sod.
3. Flats in adjacent rows should be staggered where possible (ie, a brick pattern). Sod joints should be closely laid and filled with screened topsoil. Sod fill soil should be tamped to an even surface at the required finished grade.
4. For the biofiltration swales, fill the bottom of the swale before the sides.
5. Excess flats from one site should be saved for a subsequent site. After all sites have been completed (in accordance with the attached layout), any excess flats shall be placed as directed by the Engineer.
6. All sod shall be rolled or firmly but lightly, tamped with a suitable wooden or metal tamper, sufficiently to set or press sod into underlying soil.
7. After installation has been completed, thoroughly moisten the area. Subsequent irrigation should be performed on an as-needed basis (or as directed by the Engineer) to prevent the sod from drying out.
8. Dispose of flat containers (at the contractor's expense).

#### **10-1.19 IMPORTED TOPSOIL**

Imported topsoil shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications.

#### **10-1.20 AGGREGATE BASE**

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

The first paragraph of Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications is amended by adding the following sentences:

Aggregate may include or consist of material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base, glass or a combination of any of these materials. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

The fourth paragraph in Section 26-1.02A, is amended by adding the following sentence:

Untreated reclaimed asphalt concrete and portland cement concrete will not be considered to be treated with lime, cement or other chemical material for purposes of performing the Durability Index test.

#### **10-1.21 ASPHALT CONCRETE**

Asphalt concrete shall be Type B and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

The amount of asphalt binder used in asphalt concrete placed in dikes, and aprons at the ends of drainage structures shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The miscellaneous areas to be paid for at the contract price per square meter for place asphalt concrete (miscellaneous area) in addition to the prices paid for the materials involved shall be limited to the areas listed on the plans.

Aggregate for asphalt concrete dikes shall conform to the 9.5-mm, maximum grading as specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method as provided in Section 39-3.03A(2), "Automatic Proportioning," of the Standard Specifications.

#### **10-1.22 CONCRETE STRUCTURES**

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Minor Structures shall include miscellaneous concrete structures such as junction box, catch basin, and H-Flumes.

Concrete for all portions of the work shall comply with the requirements for minor concrete, as specified in Section 90-10, "Minor Concrete", of the Standard Specifications and these Special Provisions. Minor Concrete for all items of work shall contain not less than 325 kg of cementitious material per cubic meter.

Attention is directed to "Miscellaneous Facilities," elsewhere in these special provisions.

#### **10-1.23 REINFORCEMENT**

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.



Attention is directed to "Substitution of Non-Metric Materials and Products" and "Welding Quality Control" elsewhere in these special provisions.

Where mandatory bar substitutions are required or where non-metric reinforcement is optionally substituted for metric reinforcement in accordance with these specifications, the requirements for bending, placing or splicing which are based on the size of reinforcement shall be based on the nominal size of the actual reinforcement used.

The first and second paragraphs of Section 52-1.02A, "Bar Reinforcement," of the Standard Specifications are amended to read:

Reinforcing bars shall be low-alloy steel deformed bars conforming to the specifications of ASTM Designation: A 706/A 706M and the following:

Where reinforcing bars shown on the plans or specified have a metric bar designation number shown in column "A" of the table below, corresponding bars from column "B" shall be substituted therefor.

A	B
METRIC BAR DESIGNATION NUMBER AS SHOWN ON THE PLANS OR SPECIFIED	METRIC BAR DESIGNATION NUMBER WHICH SHALL BE SUBSTITUTED FOR BARS LISTED IN COLUMN "A"
10	13
15	16
20	19
25	25
30	32*
35	36
45	43
55	57

\* Spacing of bars may be increased a maximum of 15 percent or the total number of bars may be decreased a maximum of 15 percent, unless otherwise specified.

Where the spacing of No. 30 bars is shown on the plans, the spacing of substituted No. 32 bars may be increased from that shown on the plans by a maximum of 15 percent.

Where the total number of No. 30 bars is shown on the plans, the total number of substituted No. 32 bars may be decreased from that shown on the plans by a maximum of 15 percent. The total number of substituted No. 32 bars shall be distributed in the same manner as shown on the plans for the No. 30 bars.

Where No. 30 bars are shown on the plans as vertical reinforcement in any columns or piles, the total number of substituted No. 32 bars shall be decreased from that shown on the plans for the No. 30 bars by the minimum number of bars to achieve a 15 percent reduction. The substituted No. 32 bars shall be distributed in the same manner as shown on the plans for the No. 30 bars.

At the option of the Contractor, non-metric reinforcing bars may be substituted for metric bars as shown in the table below.

METRIC BAR DESIGNATION NUMBER AS SHOWN ON THE PLANS, SPECIFIED, OR PREVIOUSLY SUBSTITUTED	NON-METRIC BAR DESIGNATION NUMBER WHICH MAY BE SUBSTITUTED
13	4
16	5
19	6
22	7
25	8
29	9
32	10
36	11
43	14
57	18

At the option of the Contractor, deformed or plain billet-steel bars conforming to ASTM Designation: A 615/A 615M, Grade 300 or 420, may be used as reinforcement in the following 5 categories:

1. Slope and channel paving;
2. Minor structures;
3. Sign and signal foundations (pile and spread footing types);
4. Roadside rest facilities; and
5. Concrete barrier Type 50 and Type 60 series and temporary railing.

When reinforcement conforming to ASTM Designation: A 615/A 615M, Grade 300 or 420 is used in the above 5 categories, all mandatory and optional substitutions, and increases in spacing or decrease in total number of bars, as specified above for ASTM Designation: A 706/A 706M reinforcement, shall apply. No other increases in spacing or decreases in the total number of bars, from that shown on the plans or specified, will be allowed.

Unless otherwise specified, all reinforcing bars shall be placed in accordance with the size and spacing, or size and total number, as shown on the plans or specified. Two copies of a list showing any changes in spacing or total number of bars from that shown on the plans or specified, and showing any non-metric bars that are substituted for metric bars, shall be furnished to the Engineer in accordance with the provisions of Section 52-1.03, "Steel Lists," of the Standard Specifications.

No adjustment will be required in spacing or total number of bars due to a difference in minimum yield strength between metric and non-metric bars.

Deformations specified in ASTM Designation: A 706/A 706M will not be required on bars used as spiral or hoop reinforcement in structures and concrete piles.

The last paragraph of Section 52-1.07, "Placing," of the Standard Specifications is amended to read:

Whenever a portion of an assemblage of bar reinforcing steel that is not encased in concrete exceeds 6 m in height, the Contractor shall submit to the Engineer for approval, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings and design calculations for the temporary support system to be used. The working drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary support system shall be designed to resist all expected loads and shall be adequate to prevent collapse or overturning of the assemblage. If the installation of forms or other work requires revisions to or temporary release of any portion of the temporary support system, the working drawings shall show the support system to be used during each phase of construction. The minimum horizontal wind load to be applied to the bar reinforcing steel assemblage, or to a combined assemblage of reinforcing steel and forms, shall be not less than 960 Pa on the gross projected area of the assemblage.

The first paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Splicing of reinforcing bars shall be by lapping, butt welding, mechanical butt splicing, or mechanical lap splicing, at the option of the Contractor. Reinforcing bars Nos. 43 through 57 shall not be spliced by lapping.

The sixth paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Except when otherwise specified, mechanical lap splicing shall conform to the details shown on the plans, the requirements for mechanical butt splices as specified in this Section 52-1.08, and Sections 52-1.08C, "Mechanical Butt Splices," 52-1.08D, "Qualification of Welding and Mechanical Splicing," and 52-1.08E, "Job Control Tests," and the following:

The mechanical lap splice shall be a unit consisting of a sleeve, in which the reinforcing bars are positioned, and a wedge driven through holes in the sleeve and between the reinforcing bars. The mechanical lap splice shall only be used for splicing non-epoxy-coated deformed reinforcing bars Nos. 13, 16 and 19. One mechanical lap splice unit per splice shall be used.

The eighth and ninth paragraphs of Section 52-1.08, "Splicing," of the Standard Specifications are amended to read:

Unless otherwise shown on the plans or approved by the Engineer, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same length required for a lapped splice in the largest bar. The minimum distance between staggered butt splices shall be 600 mm. All distances shall be measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

Completed butt splices shall develop a minimum tensile strength, based on the nominal bar area, of 430 MPa for ASTM Designation: A 615/A 615M, Grade 300 bars, and 550 MPa for ASTM Designation: A 615/A 615M, Grade 420 and ASTM Designation: A 706/A 706M bars. If butt splices are made between two bars of dissimilar strengths, the minimum required tensile strength for the splice shall be that required for the weaker bar.

The second sentence of the eleventh paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Job control tests shall be made on sample splices representing each lot of mechanical butt splices as provided in Section 52-1.08E, "Job Control Tests."

The third and fourth paragraphs of Section 52-1.08A, "Lapped Splices," of the Standard Specifications are amended as follows:

Where ASTM Designations: A 615/A 615M, Grade 420 or A 706/A 706M reinforcing bars are required, the length of lapped splices shall be as follows: Reinforcing bars No. 25, or smaller, shall be lapped at least 45 diameters of the smaller bar joined, and reinforcing bars Nos. 29, 32 and 36 shall be lapped at least 60 diameters of the smaller bar joined, except when otherwise shown on the plans.

Where ASTM Designation: A 615/A 615M, Grade 300 reinforcing bars are permitted, the length of lapped splices shall be as follows: Reinforcing bars No. 25, or smaller, shall be lapped at least 30 diameters of the smaller bar joined, and reinforcing bars Nos. 29, 32 and 36 shall be lapped at least 45 diameters of the smaller bar joined, except when otherwise shown on the plans.

Section 52-1.08B, "Butt Welded Splices," of the Standard Specifications is replaced with the following:

**52-1.08B Butt Welded Splices.**—All butt welded splices in reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D1.4, and the requirements of these specifications and the special provisions. At the option of the Contractor, shop produced resistance butt welds that are produced by a fabricator who is approved by the Transportation Laboratory may be used.

Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4-92, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.

Material used as backing for complete joint penetration butt welds of bar reinforcement shall be a flat plate conforming to the requirements of ASTM Designation: A 709/A 709M, Grade 36[250]. The flat plate shall be 6 mm thick with a width, as measured perpendicular to the axis of the bar, equal to the nominal diameter of the bar, and a length which does not exceed twice the nominal diameter of the bar. The flat plate backing shall be fitted tightly to the bar with the root of the weld centered on the plate. Any bar deformation or obstruction preventing a tight fit shall be ground smooth and flush with the adjacent surface. Tack welds used to fit backing plates shall be within the weld root area so that they are completely consumed by the finished weld. Backing plates shall not be removed.

Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 4 mm in convexity.

Before any electrodes or flux-electrode combinations are used, the Contractor, at the Contractor's expense, shall furnish certified copies of test reports for all the pertinent tests specified in AWS A5.1, AWS A5.5, AWS A5.18 or AWS A5.20, whichever is applicable, made on electrodes or flux-electrode combinations of the same class, brand and nearest specified size as the electrodes to

be used. The tests may have been made for process qualification or quality control, and shall have been made within one year prior to manufacture of the electrodes and fluxes to be used. The report shall include the manufacturer's certification that the process and material requirements were the same for manufacturing the tested electrodes and the electrodes to be used. The forms and certificates shall be as directed by the Engineer.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 615/A 615M, Grade 420 bars shall conform to the requirements of AWS A5.5 for E9018-M or E10018-M electrodes.

Electrodes for manual shielded metal arc welding of A 706/A 706M bars shall conform to the requirements of AWS A5.5 for E8016-C3 or E8018-C3 electrodes.

Solid and composite electrodes for semiautomatic gas metal-arc and flux-cored arc welding of Grade 300 reinforcing bars shall conform to the requirements of AWS A5.18 for ER70S-2, ER70S-3, ER70S-6 or ER70S-7 electrodes; or AWS A5.20 for E70T-1, E70T-5, E70T-6 or E70T-8 electrodes.

Electrodes for semiautomatic welding of ASTM Designation: A 615/A 615M, Grade 420 and ASTM Designation: A 706/A 706M bars shall produce a weld metal deposit with properties conforming to the requirements of Section 5.3.4 of AWS D1.1-96 for ER80S-Ni1, ER80S-Ni2, ER80S-Ni3, ER80S-D2, E90T1-K2 and E91T1-K2 electrodes.

Reinforcing bars shall be preheated for a distance of not less than 150 mm on each side of the joint prior to welding.

For all welding of ASTM Designation: A 615/A 615M, Grade 300 or Grade 420 bars, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D1.4-92 are superseded by the following:

The minimum preheat and interpass temperatures shall be 200°C for Grade 300 bars and 300°C for Grade 420 bars. Immediately after completing the welding, at least 150 mm of the bar on each side of the splice shall be covered by an insulated wrapping to control the rate of cooling. The insulated wrapping shall remain in place until the bar has cooled below 90°C.

When welding different grades of reinforcing bars, the electrode shall conform to Grade 300 bar requirements and the preheat shall conform to the Grade 420 bar requirements.

In the event that any of the specified preheat, interpass and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.

All welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding. The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.

Reinforcing bars shall not be direct butt spliced by thermite welding.

The first paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

Mechanical butt splices shall be the sleeve-filler metal type, the sleeve-threaded type, the sleeve-swaged type, the sleeve-filler grout type, the sleeve-lockshear bolt type, the two-part sleeve-forged bar type, or the two-part sleeve-friction bar type, at the option of the Contractor.

The third paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

The total slip of the reinforcing bars within the splice sleeve after loading in tension to 200 MPa and relaxing to 20 MPa shall not exceed the following, measured between gage points clear of the splice sleeve: 250  $\mu$ m for reinforcing bars No. 43, or smaller, or 750  $\mu$ m for reinforcing bars No. 57.

The following is added after the third paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications:

Slip requirements shall not apply to mechanical lap splices.

The fourth subparagraph of the last paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

A statement that the splicing systems and materials used in accordance with the manufacturer's procedures will develop not less than the minimum tensile strengths, based on the nominal bar area, of 430 MPa for ASTM Designation: A 615/A 615M, Grade 300 bars and 550 MPa for ASTM Designations: A 615/A 615M, Grade 420 and A 706/A 706M bars, and will comply with the total slip requirements and the other requirements in these specifications.

Section 52-1.08C(5), "Sleeve-Extruded Mechanical Butt Splices," of the Standard Specifications is replaced with the following:

**52-1.08C(5) Sleeve-Lockshear Bolt Mechanical Butt Splices.**—The sleeve-lockshear bolt type of mechanical butt splices shall consist of a seamless steel sleeve, 2 serrated steel strips welded to the inside of the sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off and the bolt ends are embedded in the reinforcing bars.

**52-1.08C(6) Two-Part Sleeve-Forged Bar Mechanical Butt Splices.**—The two-part sleeve-forged bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve that interlocks two hot-forged reinforcing bars ends. The forged bar ends may be either shop produced or field produced.

**52-1.08C(7) Two-Part Sleeve-Friction Bar Mechanical Butt Splices.**—The two-part sleeve-friction bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve whose ends are friction welded, in the shop, to the reinforcing bars ends.

The fourth paragraph of Section 52-1.08D, "Qualification of Welding and Mechanical Splicing," of the Standard Specifications is replaced with the following:

Each operator qualification test for mechanical splices shall consist of 2 sample splices. Each mechanical splice procedure test shall consist of 2 sample splices.

For sleeve-filler, sleeve-threaded, sleeve-lockshear bolt and two-part sleeve friction bar mechanical butt splices, all sample splices shall be made on the largest reinforcing bar size to be

spliced by the procedure or operator being tested except that No. 43 bars may be substituted for No. 57 bars.

For sleeve-swaged and two-part sleeve-forged mechanical butt splices, and mechanical lap splices, all sample splices shall be made on the largest reinforcing bar size of each deformation pattern to be spliced by the procedure or operator being tested. When joining new reinforcing bars to existing reinforcement, the qualification test sample bars shall be made with the deformation pattern of the new reinforcement to be joined.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications is replaced with the following:

**52-1.08E Job Control Tests.**—When mechanical butt splices, shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices are used, the Contractor shall furnish job control tests from a local qualified lab. A job control test shall consist of the fabrication, under conditions used to produce the splice, and the physical testing of 3 sample splices for each lot of 150 splices.

A lot of mechanical butt splices is defined as 150, or fraction thereof, of the same type of mechanical butt splices used for each combination of bar size and bar deformation pattern that is used in the work.

A lot of shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices, is defined as 150, or fraction thereof, of the same type of welds used for each combination of bar size and bar deformation pattern that is used in the work.

When joining new reinforcing bars to existing reinforcement, the job control test shall be made with the deformation pattern of the new reinforcement to be joined.

A sample splice shall consist of a splice made at the job site to connect two 760 mm, or longer, bars using the same splice materials, position, location, and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

Sample splices shall be made and tested in the presence of the Engineer or the Engineer's authorized representative.

Sample splices shall be suitably identified with weatherproof markings prior to shipment to the testing laboratory.

For sleeve-threaded mechanical butt splices, the reinforcing bars to be used for job control tests shall be fabricated on a random basis during the cutting of threads on the reinforcing bars of each lot and shipped to the job site with the material they represent.

For shop produced complete joint penetration butt welds, shop produced resistance butt welded splices and all types of mechanical butt splices, except the sleeve-threaded type, the Engineer will designate when samples for job control tests are to be fabricated, and will determine the limits of the lot represented by each job control test.

Should the average of the results of tests made on the 3 sample splices or should more than one sample splice in any job control test fail to meet the requirements for splices, all splices represented



by that test will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications. This rejection shall prevail unless the Contractor, at the Contractor's expense, obtains and submits evidence, of a type acceptable to the Engineer, that the strength and quality of the splices in the work are acceptable.

Section 52-1.08F, "Nondestructive Splice Tests," of the Standard Specifications is replaced with the following:

**52-1.08F Nondestructive Splice Tests.**—All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in accordance with the requirements of AWS D 1.4 and these specifications.

Prior to radiographic examination, welds shall meet the requirements of Section 4.4, "Quality of Welds," of AWS D1.4-92.

Radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 100 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.

Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.

Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.

All defects shall be repaired in accordance with the requirements of AWS D1.4.

Radiographic examinations will not be required for either shop produced complete joint penetration butt welds or shop produced resistance butt welded splices of No. 25 or smaller bars used as spiral or hoop reinforcement.

In addition to radiographic examinations performed by the Contractor, any mechanical or welded splice may be subject to inspection or nondestructive testing by the Engineer. The Contractor shall provide sufficient access facilities in the shop and at the job site to permit the Engineer or his agent to perform the inspection or testing.

The Contractor shall notify the Engineer in writing 48 hours prior to performing any radiographic examinations.

The radiographic procedure used shall conform to the requirements of ASME Boiler and Pressure Vessels Code, Section V, Article 2 and the following:

Two exposures shall be made for each complete joint penetration butt welded splice. For each of the two exposures, the radiation source shall be centered on each bar to be radiographed. The first exposure shall be made with the radiation source placed at zero degrees from the top of the weld and perpendicular to the weld root and identified with a station mark of "0." When



obstructions prevent a zero degree placement of the radiation source for the first exposure, and when approved in writing by the Engineer, the source may be rotated, around the centerline of the reinforcing bar, a maximum of 25 degrees. The second exposure shall be at 90 degrees to the "0" station mark and shall be identified with a station mark of "90."

For field produced complete joint penetration butt welds, no more than one weld shall be radiographed during one exposure. For shop produced complete joint penetration butt welds, if more than one weld is to be radiographed during one exposure, the angle between the root line of each weld and the direction to the radiation source shall be not less than 65 degrees.

Radiographs shall be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays shall have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays shall be from the iridium 192 isotope and the emitting specimen shall not exceed 4.45 mm in the greatest diagonal dimension.

The radiographic film shall be placed perpendicular to the radiation source at all times; parallel to the root line of the weld unless source placement determines that the film must be turned; and as close to the root of the weld as possible.

The minimum source to film distance shall be maintained so as to insure that all radiographs maintain a maximum geometric unsharpness of 0.020 at all times, regardless of the size of the reinforcing bars.

All penetrameters shall be placed on the source side of the bar and perpendicular to the radiation source at all times. One penetrameter shall be placed in the center of each bar to be radiographed, perpendicular to the weld root, and adjacent to the weld. Penetrameter images shall not appear in the weld area.

When radiography of more than one weld is being performed per exposure, each exposure shall have a minimum of one penetrameter per bar, or three penetrameters per exposure. When 3 penetrameters per exposure are used, one penetrameter shall be placed on each of the 2 outermost bars of the exposure, and the remaining penetrameter shall be placed on a centrally located bar.

An allowable weld buildup of 4 mm may be added to the total material thickness when determining the proper penetrameter selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrameter blocks shall not be used.

Penetrameters shall be sufficiently shimmed using a radiographically identical material. Penetrameter image densities shall be a minimum of 2.0 and a maximum of 3.6.

All radiographic film shall be Class 1, regardless of the size of reinforcing bars.

Radiographs shall be free of film artifacts and processing defects, including, but not limited to, streaks, scratches, pressure marks, or marks made for the purpose of identifying film or welding indications.

Each splice shall be clearly identified on each radiograph and the radiograph identification and marking system shall be established between the Contractor and the Engineer before radiographic inspection begins. Film shall be identified by lead numbers only; etching, flashing, or writing in identifications of any type will not be permitted. Each piece of film identification

information shall be legible and shall include, as a minimum, the following information: Contractor's name, date, name of nondestructive testing firm, initials of radiographer, contract number, part number, and weld number. The letter "R" and repair number shall be placed directly after the weld number to designate a radiograph of a repaired weld.

Radiographic film shall be developed within a time range of one minute less to one minute more than the film manufacturer's recommended maximum development time. Development on the job site will not be allowed.

Processing chemistry shall be done with a consistent mixture and quality, and processing rinses and tanks shall be clean to ensure proper results. Records of all developing processes and any chemical changes to the developing processes shall be kept and furnished to the Engineer upon request. The Engineer may request, at any time, that a sheet of unexposed film be processed in the presence of the Engineer to verify processing chemical and rinse quality.

All radiographs shall be interpreted and graded by a Level II or Level III technician who is qualified in accordance with the American Society for Nondestructive Testing's Recommended Practice No. SNT-TC-1A. The results of these interpretations shall be recorded on a signed certification and a copy kept with the film packet.

Technique sheets prepared in accordance with ASME Boiler and Pressure Vessels Code, Section V, Article 2 Section T-291 shall also contain the developer temperature, developing time, fixing duration and all rinse times.

All radiographic envelopes shall have clearly written on the outside of the envelope the following information: name of the Contractor's Quality Control Manager (QCM), name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers or a report number, as detailed in the Contractor's Quality Control Plan (QCP). In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the Contractor's QCP.

#### **10-1.24 PLASTIC PIPE**

Plastic pipe shall conform to the provisions in Section 64, "Plastic Pipe," of the Standard Specifications.

#### **10-1.25 CORRUGATED METAL PIPE**

Corrugated steel culverts shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Corrugated steel pipe shall be fabricated from zinc-coated steel sheet.

#### **10-1.26 MISCELLANEOUS FACILITIES**

Flared end sections, energy dissipators, pipe inlets, flumes, lysimeters, and catch basin inserts shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

## H-FLUMES

H- Flumes shall be of the sizes shown on the plans. The flume shall be a molded fiberglass reinforced polyester structure. The interior surface shall have a 10 to 15 mil. white, ultraviolet-resistant gel-coat backed by a layer of resin and chopped glass forming a water and chemical resistant surface. The remainder of the laminate shall be fiber glass reinforced polyester containing not less than 30 percent glass contents by weight. The thickness of the walls and the floor of the flume shall not be less than 25 mm; and shall be reinforced with stiffeners down the sides and across the bottom on the flumes 300 mm or greater.

The flume shall be provided with anchoring clips by the manufacturer fastened along the side of the flume to be used for anchorage to concrete. Stiffeners shall be provided across the top of the flume by the manufacturer to provide structural support during the shipping and installation.

The flumes shall be provided with a removable 6.35 mm X .011 T-304 stainless steel bubbler tube, mounted in groove in flume wall.

The flume dimensions shall be in accordance with the United States Department of the agriculture, Handbook No.224 . The manufacturer shall have a ongoing, documented quality control program.

The following guidelines shall be adhered to during installation:

1. When unloading, use spreader bar and fabric sling for handling. Do not use cable or chain.
2. Level from inlet to outlet and side to side. The walls must be vertically plumb.
3. Anchor flume securely by using side clips.
4. If the flume is to be cast in concrete or back filled with earth, it is important to avoid distortion. It is recommended to rough in an oversized channel, then grout in the flume after the first pour has set.
5. Be sure to brace the flume internally when back filling. If concrete is poured around the flume, be aware of possible bulging due to improper bracing.
6. It may be necessary to place sand bags inside the flume to prevent it from floating in wet concrete.
7. The use of a vibrator is not recommended.

## PALMER-BOWLUS FLUMES

Palmer-Bowlus flumes shall be of the sizes as shown on the plans. The flumes shall be a molded structure of fiberglass reinforced polyester. The interior surface shall have a ten (10) to fifteen (15) mil white ultraviolet-resistant gel-coat backed by a rich layer of resin and chopped glass forming a water and chemical resistant surface. The remainder of the laminate shall be a fiberglass reinforced polyester containing not less than thirty percent (30%) glass by weight. The thickness of the walls and floor of the flume shall not be less than 6 millimeters (6 mm).

The flume shall be provided with anchoring clips fastened along the side of the flume to be used for anchorage into the concrete. Stiffeners made of FRP angle/channel shall be provided across the top of the flume to provide structural support during shipping and installation.

## LYSIMETER

The lysimeter shall be the tube type and have the tube section in the middle. The lysimeter shall have porous Teflon ® filter material.

The lysimeter shall be placed in a bed of silica flour slurry prior to being covered by this material.

The tube shall be furnished in either a 69.85 mm or .26 mm O.D. The lysimeter shall be manufactured of Teflon ® body and Teflon porous section.

### Lysimeter Preparation

Before the lysimeter is installed, it shall be vacuum tested to ensure that there is no air leakage. The procedures that will be used are described below. The manufacturer will ship the lysimeter with a latex or flexible plastic membrane around the porous membrane. Rubber bands will be placed over the membrane overlaps to maintain a seal. The lysimeter stopcocks and/or clamps will be closed. A vacuum pump shall be connected to the vacuum/pressure tube and a vacuum in excess of 10 psi (508 mm of mercury (Hg)) shall be applied. The vacuum reading on the gauge will be monitored and noted. The system shall be left in this state for 3 hours. A drop of up to 1.5 psi (76 mm of Hg) over this time is acceptable. If a larger drop occurs, all the connections will be re-tightened and the lysimeter shall be re-tested.

After the lysimeter has passed this vacuum test, the lysimeter shall be placed in distilled water and a vacuum of approximately 7.5 psi (380 mm of Hg) applied for about one hour. This procedure pre-wets all surfaces of the porous membrane, and removes entrained air in the porous membrane. The distilled water shall be removed from the lysimeter before it is installed in the field by using the following protocol.

1. Fit a clean rigid polyethylene sample container (400 mL minimum volume) with a two-port bung to the sample collection tube, making a sealed system (refer to Figure X-X). The tube from the lysimeter should protrude into the sample container approximately one-half inch (13 mm). The other tube to the vacuum/pressure pump should be flush with the bung.
2. Ensure that the vacuum/pressure tube and sample collection tube stopcocks are in the open position.
3. Evacuate the sample from the lysimeter by applying a vacuum of approximately 10 psi (508 mm of Hg).
4. Close the sample tube stopcock and apply a vacuum of 10 psi (508 mm of Hg) to the vacuum/pressure tube and then close the vacuum tube stopcock. The lysimeter is now ready to be installed in the field.

### Borehole Preparation

The borehole for the lysimeter shall be excavated after the infiltration trench is fully excavated and before any washed gravel is placed into the trench. The borehole shall be excavated to provide adequate space for the lysimeter body to be surrounded by a silica flour pack. A two-inch diameter (51 mm) lysimeter shall be used and requires a six-inch (150mm) or larger diameter borehole. This diameter will allow for at least 1.5 inches (38 mm) of silica flour pack to fill the annular space between the filter membrane and the walls of the borehole. The borehole shall be excavated to a depth of approximately

14.64 ft (4.46 m) below ground surface. If difficulties are encountered in maintaining an open borehole, casing shall be used to temporarily hold back the soil during lysimeter installation.

#### Lysimeter Installation

Crystalline silica flour and distilled water shall be mixed at a ratio of 150 mLs of water to 450 grams of silica flour. Approximately 50 pounds of silica flour shall be mixed with 2 gallons of distilled water to make enough slurry for a single lysimeter installation in a six-inch (150 mm) borehole. The slurry shall be mixed by adding the silica flour slowly to the distilled water under constant stirring. The mix shall be completely blended to contain no lumps.

When the slurry is completely mixed, a portion shall be poured into the borehole providing a bed for the lysimeter to be placed on. This bed shall be poured to an approximately thickness of 0.10 ft (30 mm). After the bed is poured, a plug shall be threaded onto the lysimeter so that PVC casing can be used to lower and support the lysimeter in the center of the borehole.

The PVC casing shall extend to the top of the infiltration trench and will contain the vacuum/pressure and sample tubing. A minimum of at least 1.5 inch (38 mm) of silica slurry shall be placed in the annular space around the lysimeter. Slurry shall also be poured into the annular space of the borehole to completely surround and cover the lysimeter body.

After the slurry has set for at least two hours, a bentonite seal shall be installed in the annular space of the borehole from the top of the silica flour pack to the bottom of the infiltration trench. After the bentonite seal is installed, construction of the trench may be completed.

Upon completion of the infiltration trench construction, the lysimeter head assembly shall be installed on the PVC casing and the vacuum/pressure and sample collection tubing shall be connected to the appropriate ports. A locking metal cap shall be installed over the lysimeter head assembly by anchoring cap to the concrete seal.

#### OBSERVATION WELL

The Observation Well shall be constructed as shown on the plans and in accordance with the following special provisions.

##### Borehole Preparation

An 8 inch borehole for the 4 inch pressure transducer PVC casing shall be excavated after the infiltration trench is fully excavated and before any washed gravel is placed into the trench. The borehole shall be excavated to a depth of approximately 4 ft. (1.22 m) below the infiltration trench floor. If difficulties are encountered in maintaining an open borehole, casing shall be used to temporarily hold back the soil during installation.

##### Well Construction

Bentonite chips (1/4 inch) shall be poured into the borehole providing a bed for the PVC casing. This bed shall be poured to an approximate thickness of 0.10 feet (30 mm). After the bed is poured, a plug shall be secured to the bottom of the threaded-blank PVC casing. The casing shall be centered in the borehole and placed on the bed of bentonite chips. The threaded-blank PVC casing shall extend to

the bottom of the infiltration trench. Slotted screen (0.40 inch) PVC casing shall be threaded to the threaded-blank PVC casing and extended to 4 feet below the infiltration trench surface. A second piece of threaded-blank PVC casing shall be threaded to the slotted screen PVC casing and extended to approximately 6 inches (150 mm) above the infiltration trench surface. No PVC shall be used to join PVC casing sections. Bentonite chips shall be poured in the annular space of the borehole around the PVC casing to the depth reaching the bottom surface of the infiltration trench and then hydrated.

After the bentonite has hydrated for approximately one hour, backfill of the infiltration trench may be completed. Upon backfill completion, a locking metal cap shall be installed over the PVC casing by anchoring the cap to the concrete seal.

### CATCH BASIN INSERTS

Catch Basin Inserts as specified on the Plans shall conform to the manufacturers requirements for "Fossil Filter" as manufactured by KriStar Enterprises, Inc., Santa Rosa, California or "StreamGuard" as manufactured by Foss Environmental, Seattle, Washington.

"Fossil Filter" catch basin inserts shall be "Standard Grate Inlet Model", and shall be manufactured of component parts supplied by the manufacturer for installation in the G2M Drain Inlets as shown on the plans. The trough and filter cartridge shall be manufactured from Type 304 stainless steel, or petroleum resistant fiberglass. The filter media shall be an adsorbent material that contains no hazardous ingredients as defined by the EPA, OSHA or WHO. Installation of the "Fossil Filter" catch basin inserts shall be in accordance with the manufacturer's recommendations.

"StreamGuard" catch basin inserts shall be "StreamGuard Oil and Grease Catch Basin Insert (#3001)". The geotextile fabric apron of the catch basin insert shall be trimmed to fit the configuration of the G2M Drain Inlets as shown on the plans. Installation of the "StreamGuard" catch basin inserts shall be in accordance with the manufacturer's recommendations.

### **10-1.27 SLOPE PROTECTION**

Slope protection shall conform to the provisions in Section 72, "Slope Protection," of the Standard Specifications.

### **10-1.28 MISCELLANEOUS IRON AND STEEL**

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

The contract price paid per kilogram for miscellaneous iron and steel shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals and for doing all the work involved in furnishing, constructing or installing miscellaneous iron and steel, complete in place, including **Extruded Seal** ( Nitrile Rubber Durometer 45-50 shore 00 ) as shown on the plans and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.29 CHAIN LINK FENCE**

Chain link fence shall be Type CL-1.8 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

### **10-1.30 CHAIN LINK WALK GATES**

Chain link walk gates shall be Type CL-1.8 conforming to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Gates shall be installed in existing fences at the locations shown on the plans. Gate installations shall be complete with gate post, latch post, concrete footings, braces, truss rods, and hardware. Gate and latch posts shall be braced to the next existing line post as shown on the plans.

At each gate location, an existing line post shall be removed and the new gate installed so it is centered on the post hole of the removed post. Holes resulting from the removal of line posts shall be backfilled.

Gate mounting and latching hardware shall not contain open-end slots for the fastening bolts.

Chain link fabric for gates shall be of the same mesh size as the existing fence in which the gates are installed.

Openings made in existing fences for installation of gates shall be closed during the working day in which the openings are made and when work is not in progress. Temporary closures shall be made with the existing fence fabric or with additional 1.83-m chain link fabric as directed by the Engineer.

Full compensation for making the openings in existing fences, for temporary closing of the openings (including furnishing additional fence fabric if necessary), and for new posts, footings, hardware, braces, and truss rods shall be considered as included in the contract unit price paid for 1.2-m chain link gate (Type CL-1.8) and no additional compensation will be allowed therefor.

### **10-1.31 METAL BEAM GUARD RAILING**

Metal beam guard railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Line posts and blocks shall be wood.

The ninth, eleventh and twelfth paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications are amended to read:

Wood posts and blocks shall be timbers No. 1 (structural) grade Douglas fir or timbers No. 1 grade Southern yellow pine. Wood posts and blocks shall be graded in accordance with the provisions in Section 57-2, "Structural Timber," except allowances for shrinkage after mill cutting shall in no case exceed 5 percent of the American Lumber Standards minimum sizes, at the time of installation.



Wood posts and blocks shall be pressure treated after fabrication as provided in Section 58, "Preservative Treatment of Lumber, Timber and Piling," with creosote, creosote-coal tar solution, creosote-petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, ammoniacal copper zinc arsenate, or chromated copper arsenate (Southern yellow pine only) except that, when other than one of the creosote processes is used, blocks shall have a minimum retention of  $6.4 \text{ Kg/m}^3$ , and need not be incised.

If copper naphthenate, ammoniacal copper arsenate, chromated copper arsenate, or ammoniacal copper zinc arsenate is used to treat the wood posts and blocks, the bolt holes shall be treated as follows:

Before the bolts are inserted, bolt holes shall be filled with a grease, recommended by the manufacturer for corrosion protection, which will not melt or run at a temperature of  $65^\circ\text{C}$ .

Metal beam guard rail elements and any required backup plates, terminal sections, end sections, and return sections shall conform to the requirements of Type 2 W-Beam as shown in AASHTO Designation: M 180.

#### **10-1.32 TERMINAL SYSTEM (TYPE SRT).**

Terminal system (Type SRT) shall consist of a SRT-350 Slotted Rail Terminal as manufactured by Syro, Inc., a Trinity Industries Company, and shall be furnished and installed as shown on the plans, and as specified in these special provisions.

Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal from the manufacturer, Syro, Inc., a Trinity Industries Company, P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal, FOB Centerville, Utah is \$1155.00, not including sales tax. The quoted price includes the cost of two 3.8-m sections of slotted metal beam guard rail elements, one 3.8-m section of unslotted metal beam guard rail element, a buffer terminal section, a cable assembly and cable anchor bracket, a steel strut, 2 soil plates, 2 steel foundation tubes, 9 posts and required blocks and hardware for installing the terminal system (Type SRT) as shown on the plans.

The above price will be firm for orders placed on or before December 31, 1998, provided delivery is accepted within 90 days after the order is placed.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-1.07, "Certificate of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal system (Type SRT) complies with the contract plans and specifications, conforms to the prequalified design and material requirements and was manufactured in accordance with the approved quality control program.

The terminal system (Type SRT) shall be installed in accordance with the manufacturer's installation instructions and these requirements. At the Contractor's option, the steel foundation tubes, with soil plates attached, shall be either driven, with or without pilot holes, or placed in drilled holes. Any space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood terminal posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts



are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

The quantity of terminal systems (Type SRT) will be measured as units determined from actual count in place in the completed work.

The contract unit price paid for terminal system (Type SRT) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in furnishing and installing terminal system (Type SRT), complete in place, including excavation, backfill and disposal of surplus material and connecting the terminal system to new or existing metal beam guard railing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **~~10-1. CABLE RAILING~~**

~~Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.~~

#### **10-1.33 CRASH CUSHION, SAND FILLED**

Sand filled crash cushions shall be furnished and installed as shown on the plans, and as specified in the Standard Specifications and these special provisions.

A sand filled crash cushion shall consist of a grouping of sand filled modules.  
Crash cushions shall be installed at the following locations shown on the plans:

At the Contractor's option, modules for use in sand filled crash cushions shall be either Energite Inertial Modules, Fitch Inertial Modules or equal:

Energite Inertial Modules manufactured by Energy Absorption Systems, Inc. One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.

Distributor (Northern): Traffic Control Service, Inc. 8585 Thys Court, Sacramento, CA 95828 Telephone 1-800-884-8274, FAX (916) 387-9734

Distributor (Southern): Traffic Control Service, Inc. 1881 Betmor Lane, Anaheim, CA 92805 Telephone 1-800-222-8274, FAX (714) 937-1070.

Fitch Inertial Modules National Distributor: Roadway Safety Service, Inc. 700-3 Union Parkway, Ronkonkoma, NY, 11779.

Distributor: Singletree Sales Company 1533 Berger Drive, San Jose, CA 95112 Telephone 1-800-822-7735.

Modules contained in the crash cushion shall be of the same type at each location. The color of modules shall be the standard yellow color as furnished by the vendor, with black lids. The exterior components of the modules shall be formulated or processed to resist deterioration from ambient

ultraviolet rays. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the crash cushions comply with the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in accordance with the approved quality control program.

Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water, as determined by California Test 226.

Modules placed on bridge decks shall be provided with positioning blocks fastened to the deck surface. Positioning blocks shall be shaped as segments of a ring and placed along the inner or outer periphery of the module wall. A minimum of 2 blocks, a minimum of one-sixth of a ring in length shall be provided for each module. Positioning blocks and fasteners shall be of a material that is corrosion and water resistant.

Module cylinders shall be filled with sand in accordance with the manufacturer's directions, and to the sand capacity in kilograms for each module as shown on the plans.

Lids shall be securely attached as recommended by the manufacturer.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods approved by the Engineer.

Sand filled crash cushions, regardless of the number of modules required in each sand filled crash cushion, will be measured and paid for by the unit as crash cushion, sand filled. The quantity to be paid for will be determined from actual count of the units in place in the completed work.

The contract unit price paid for crash cushion, sand filled shall include full compensation for furnishing all labor, materials (including sand and marker panels), tools, equipment and incidentals, and for doing all the work involved in furnishing and installing the crash cushion complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

#### 10-1.34 SLURRY CEMENT

Slurry Cement shall be placed in the Energy Dissipators and Flow Spreaders as shown on the plans, and as specified in the Standard Specifications and these special provisions. The Slurry Cement shall conform to the specifications for Slurry Cement Backfill provided in Section 19-3.062 of the Standard Specifications.

##### Energy Dissipators

All water shall be removed from the structures prior to placing the Slurry Cement.

All visible debris shall be removed from the structures and disposed of prior to placing the Slurry Cement.

The top 150 mm of rip-rap shall be removed from the Energy Dissipators prior to placing the Cement Slurry and shall be embedded in the Cement Slurry as shown on the plans.

#### Flow Spreaders

All water shall be removed from the structures prior to placing the Slurry Cement.

All visible debris shall be removed from the structures and disposed of prior to placing the Slurry Cement.

All rip-rap shall be removed from the Flow Spreaders prior to placing the Cement Slurry and shall be embedded in the Cement Slurry as shown on the plans.

The contract Lump Sum price paid for Placing Slurry Cement at each site shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing the Slurry Cement in all specified structures at that site, as shown on the plans and as specified in these Special Provisions.

#### 10-1.35 EQUIPMENT PAD RELOCATION

The Relocation of the Equipment Pad at Las Flores Maintenance Station shall be performed as shown on the plans, and as specified in the Standard Specifications and these special provisions.

Attention is directed to Sections 10-1.16 and 10-3.02 of these Special Provisions for installation of the 50 mm PVC Conduit, which crosses existing utilities where shown on the plans.

The Contractor shall coordinate the modification of the exterior building conduit with the Maintenance Station Superintendent.

Caution must be exercised to avoid damaging all existing BMP Pilot components, including the existing monitoring vault, the fiberglass equipment enclosure, and all equipment inside the equipment enclosure. The fiberglass equipment enclosure and all interior equipment will be removed from the equipment pad by the Engineer.

The contract Lump Sum price paid for Relocating the Equipment Pad at Las Flores Maintenance Station shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work at Las Flores Maintenance Station, as shown on the plans and as specified in these Special Provisions.

#### 10-1.36 FLOW SPREADER DRAIN

The Contractor shall install a drain in the Biofiltration Strip Concrete Flow Spreader at Altadena Maintenance Station as shown on the plans and as specified in these Special Provisions.

Non-shrink, non-metallic grout shall be used to provide a water-tight seal around the PVC Drain Pipe.

The contract Lump Sum price paid for Installing the Flow Spreader Drain at Altadena Maintenance Station shall include full compensation for furnishing all labor, materials, tools, equipment, and

incidentals, and for doing all the work at Altadena Maintenance Station, as shown on the plans and as specified in these Special Provisions.

### **10-2.03 EXISTING HIGHWAY IRRIGATION FACILITIES**

In addition to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications, the work performed in connection with the various existing highway irrigation system facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Existing irrigation facilities shown on the plans or specified in these special provisions to be removed, relocated or salvaged shall remain in place until their use, as determined by the Engineer, is no longer required.

Existing irrigation facilities that are to remain, or are to be maintained, relocated or salvaged as part of this contract, shall be protected from damage. If the Contractor's operations damage the existing irrigation facilities, the Contractor shall, at the Contractor's expense, repair or replace the damaged facilities as follows:

Repair or replacement of damaged facilities shall be completed within 10 working days of the damage.

Replaced irrigation facilities shall be new, and of equal or better quality than the damaged facility. Replacement irrigation facilities shall be compatible with the irrigation systems to remain.

After repair or replacement of the facilities is complete, the Contractor shall demonstrate to the Engineer that the repaired or replaced facilities operate properly. When remote control valves are repaired or replaced, the valves shall be tested with the irrigation controller in the automatic mode.

### **10-2.04 RELOCATE EXISTING IRRIGATION FACILITIES**

Relocate existing irrigation facilities shall consist of relocating existing electric remote control valves, sprinklers, pull boxes, backflow preventers, gate valves, wye strainers, irrigation controllers and other facilities as shown on the plans or specified in these special provisions.

Relocate existing sprinklers shall consist of relocating existing sprinklers, risers, riser supports, check valves and concrete protectors as shown on the plans.

Relocate pull boxes shall consist of relocating existing pull boxes and pull box covers. Relocated pull boxes shall be installed on new woven wire cloth and crushed rock bedding as shown on the plans for valve box installations.

Relocate existing irrigation controllers shall consist of relocating the existing controllers, controller enclosures and controller enclosure cabinets; constructing concrete pads; and furnishing and installing anchor bolts, electrical conduits, including control and neutral conductors and electrical power conductors. Conduits for control and neutral conductors and electrical power conductors shall terminate in separate new or relocated pull boxes located within 1.5 m of the new concrete pads.

After irrigation facilities have been relocated, the Contractor shall demonstrate to the Engineer that the relocated facilities function properly.

Full compensation for relocating existing irrigation facilities shall be considered as included in the contract lump sum price paid for irrigation system and no separate payment will be made therefor.

## **SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS**

### **10-3.01 DESCRIPTION**

Modifying systems shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

### **10-3.02 COST BREAK-DOWN**

The Contractor shall furnish to the Engineer a cost break-down for each contract lump sum item of work described in this Section 10-3.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval.

No adjustment in compensation will be made in the contract lump sum prices paid for the various electrical work items due to any differences between the quantities shown in the cost break-down furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

The sum of the amounts for the units of work listed in the cost break-down for electrical work shall be equal to the contract lump sum price bid for the work. Overhead, profit, bond premium, temporary construction facilities, plant and other items shall be included in each individual unit listed in the cost break-down; however, costs for traffic control system shall not be included.

The cost break-down shall be submitted to the Engineer for approval within \_\_ days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

At the Engineer's discretion the approved cost break-down may be used to determine partial payments during the progress of the work and as the basis of calculating the adjustment in compensation for the item or items of electrical work due to changes ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down, the adjustment in compensation may be determined at the Engineer's discretion in the same manner specified for increases and decreases in the quantity of a contract item of work in accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

The cost breakdown shall, as a minimum, include the following items:

foundations - each type( Service entrance Equipment foundation)  
conduit - list by each size and installation method (53 mm PVC / Direct Burial)  
pull boxes - each type (0.61 M x 0.92 M)  
conductors - each size and type (3 -#10 XHHW)  
service equipment enclosures X(3R)

### 10-3.03 CONDUIT

Conduit to be installed underground shall be Type 3 unless otherwise specified.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

Conduit sizes shown on the plans and specified in the Standard Specifications and these special provisions are referenced to metallic type conduit. When rigid non-metallic conduit is required or allowed, the nominal equivalent industry size shall be used as shown in the following table:

Size Designation for Metallic Type Conduit	Equivalent Size for Rigid Non-metallic Conduit
21	20
27	25
41	40
53	50
63	65
78	75
103	100

When a standard coupling cannot be used for joining Type 1 conduit, a UL listed threaded union coupling, as specified in the third paragraph in Section 86-2.05C, "Installation," of the Standard Specifications, or a concrete-tight split coupling or concrete-tight set screw coupling shall be used.

Conduit runs shown on the plans to be located behind curbs may be installed in the street, within 0.9-m of, and parallel to the face of the curb, by the "Trenching in Pavement Method" described in Section 86-2.05C, "Installation," of the Standard Specifications. Pull boxes shall be located behind the curb or at the locations shown on the plans.

After conductors have been installed, the ends of conduits terminating in pull boxes, and in service and controller cabinets shall be sealed with an approved type of sealing compound.

At locations where conduit is required to be installed under pavement and existing underground facilities require special precautions, as described in "Obstructions" of these special provisions, conduit shall be placed by the "Trenching in Pavement Method" as specified in Section 86-2.05C, "Installation," of the Standard Specifications.

Pull ropes for use when installing cables in Type 3 conduit shall consist of a flat, woven, lubricated, soft-fiber polyester tape with a minimum tensile strength of 8000 N and shall have printed sequential measurement markings at least every meter.

At the option of the Contractor, the final 0.6-m of conduit entering a pull box in a reinforced concrete structure may be Type 4.

#### **10-3.04 CONDUCTORS AND WIRING**

Splices shall be insulated by "Method B" or, at the Contractor's option, splices of conductors shall be insulated with heat-shrink tubing of the appropriate size after thoroughly painting the spliced conductors with electrical insulating coating.

The fourth paragraph of Section 86-2.08B, "Multiple Circuit Conductors," of the Standard Specifications is amended to read:

Conductors for wiring Service Entrance Equipment shall be stranded copper, with insulation rated for use at temperatures up to 90°C.

#### **10-3.05 SERVICE**

Continuous welding of exterior seams in service equipment enclosures is not required.

On Standard Plan ES-2E, in the table entitled "Type III-B Service (120/240 V) Equipment Legend", for Item No. 15, the component is revised to read "100 A, 240 V, 3P, CB". One circuit breaker is required.

On Standard Plan ES-2F, in the table entitled "Type III-C Service (120/240 V) Equipment Legend" for Item No. 15, the component is revised to read "100 A, 240 V, 2 - 2P, CB".

Circuits with Model 500 changeable message signs shall have service equipment enclosures which have main busses and terminal lugs rated for 200 A, minimum, and a No. 2 bare copper ground wire.

Each service shall be provided with up to 2 main circuit breakers which shall disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as shown on the plans or required in the special provisions, each of the circuit breakers shall have a minimum interrupting capacity of 10 000 A, rms.

Dead front panel or panels, and corresponding exterior door, shall be hinged on one side and shall be openable without the use of tools.

A barrier type terminal block rated for 40 A, minimum, shall be provided in each service equipment enclosure. The terminal block shall have a minimum of 12 positions with terminals rated at Size No. 8 or larger, to accept the field wires indicated on the plans. Field wires shall be terminated using crimped, insulated loop connectors.

#### **10-3.06 PAYMENT**

The contract lump sum price or prices paid for signal and lighting shall include highway lighting at intersections in connection with signals only.

Any other roadway lighting on the project shall be considered as included in the contract lump sum price paid for lighting and sign illumination.